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GROUNDWATER SOURCE CONTROL INTERIM MEASURES DESIGN ANALYSIS, PLANS AND SPECIFICATIONS EAST HELENA FACILITY

Prepared for
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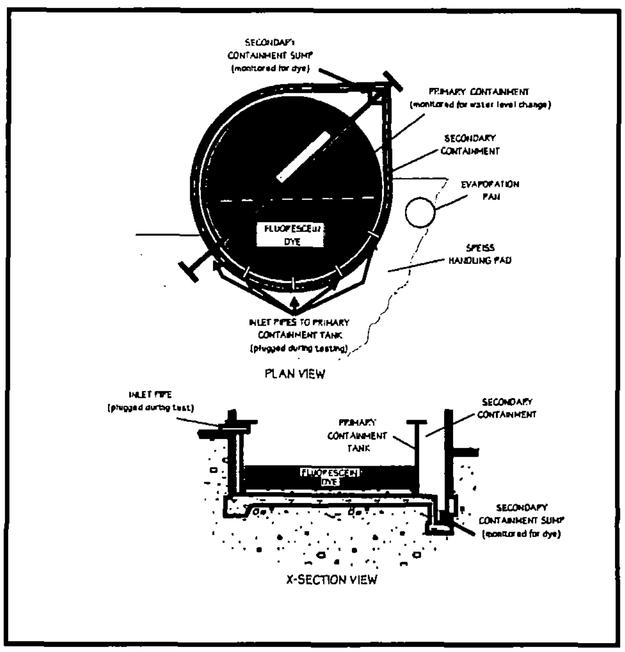

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Consulting Scientists, Engineers and Consultan

RESPONSE TO EPA COMMENTS
DATED FEBRUARY 16, 2000
ON SOURCE CONTROL
INTERIM MEASURES DESIGN ANALYSIS
DECEMBER 1999

GENERAL COMMENTS

1. *Locations where surface water flows adjacent to, across, or ponds at railroad crossings would appear to be a significant source of water infiltration. The railroad tracks are typically constructed upon a layer of crushed gravel (ballast) which could be an ideal pathway for surface water to infiltrate and reach groundwater. This pathway should be evaluated in more detail in this document. One mitigation measure may be to not allow stormwater runoff to come into contact with railroad ballast material. Photos 1 and 12 show two railroad areas where infiltration may be pronounced.*

   Response: This investigation focused on runoff from specific source areas identified in the work plan. The speiss handling area is the only IM source which has adjacent railroad tracks. The proposed source controls for this area are designed to eliminate any direct runoff from the Speiss Handling Area to these railroad tracks. There is also recharge to these railroad tracks from other areas outside the immediate Speiss Handling Area. The potential for mobilization of metals along railroad corridors over the remaining portions of the site will be evaluated as part of the RFI. The RFI Work Plan, scheduled for submittal to EPA March 24, 2000 includes a sample program to evaluate metals in soils along all of the unpaved rail corridors. It should be noted that the coarse gravel and quarry spar ballast commonly associated with rail lines are not present along rail lines within the East Helena Facility. In the plant, the rail lines are constructed on silt-clay-sand fill soils, which would not be as permeable to infiltration as gravel and quarry spars.

2. *Examination of the speiss handling procedures was included as a task in the Interim Measures Work Plan (see page 4-3, bullet 3). The IM Report does not appear to fully explain the speiss handling procedures. A figure should be provided in the IM report showing areas where speiss is managed, including all stockpiles, bins and haulage routes. A concise description of the handling procedures should also be included in the text. This description should include how much material is typically stockpiled, the reason for storing at certain bins, and for how long the stockpiles are exposed to the elements and require watering. Interim measures for speiss handling procedures should be incorporated into the document.*

   Responses: Figure 2-1 shows the principal area where Speiss is handled and the speiss handling pad were spess is routinely stockpiled. The Source Control IM report has been revised to provide additional detail on speiss handling practices including additional areas where speiss may be stored prior to shipping (Section 2.1). It also provides information on the revised speiss handling practices that will be implemented as part of Certified Pad Requirements for Phase IV LDRs per ARM 17.54.307 (Section 4.1.7). The revised speiss handling practices include abandonment of the present speiss handling pad and replacement with certified pads or buildings.

3. *To be clear about the limits of this report, Figure 2-1 of the IM Report should include the outline from Figure 4-1-2, IM Work Plan and mention should be made in the text that this was the predefined limit for mapping*

   Response: As suggested in the comment, the facility area boundary has been added to a revised Figure 2-1. This revised figure incorporates the boundary outline as shown on Figure 4-1-2 of the IM Work Plan. It also combines information shown on existing Figures 2-1 and 2-2 to consolidate the information presented in these two figures and add clarity not present on existing Figure 2-1.

4. *Implementing the interim corrective measures could effect stormwater runoff. The facility's Storm Water Pollution Prevention Plan should be modified accordingly.*

   Response: In response to the comment a review of the plan was conducted for possible conflicts or changes driven by the proposed Interim Measures. The proposed IM measures do not affect the existing Storm Water Pollution Prevention Plan for the site.

5. *More detail is required to explain "Additional duties may be administratively difficult "These activities are an integral part of the plan and Asarco must find a way to effectively implement them.*

   Response: More detail has been added to the discussion concerning "additional duties may be administratively difficult". In general, the additional duties will be addressed by an on-site training program to prepare site personnel for the additional activities necessary to implement Interim Measures.

SPECIFIC COMMENTS

1. ***Pg III:** Section Heading 2.1 is missing. This section heading is also missing in the report.*

   Response: The heading in the Table of Contents and in the Report has been modified as Section 2.1 as appropriate. Existing Section 2.3 is modified to Section 2.2.

2. ***Sec 1.0:** This work is being completed, in part, due to increasing arsenic levels in certain wells. This understanding and the well identifications should be included in the introduction.*

   A discussion describing the "source" would be appropriate. It is not clear if the source is surface water, constituents in the surface water, surface water that contacts production material, product material, surface water in contact with impacted soil, or a combination of these or other factors.

Response: In response to this comment, the introduction discussion has been expanded to summarize the understanding of present groundwater conditions at the plant site, including identified source areas of arsenic and metals to groundwater and the mechanisms that presently mobilize these constituents into the groundwater system. Contrary to the comment, although arsenic concentrations remain elevated in site monitoring wells, long-term monitoring trends show decreasing arsenic concentration trends in most areas which reflect positive results from past remedial measures on the site.

3. *Sec 2.0: Feature numbers in Figures 2-2 and 3-2, where they are referenced in the text of the report, should be formatted bold so that the description can be more easily referenced. Make sure all the photos are referenced in the text. Photo 20 does not appear to be referenced or described.*

   Response: Figures 2-2 and 3-2 have been modified as requested in the comment. The text has been reviewed for photo references and additional references have been added where appropriate.

4. *Pg 2-1: Section 2.1 heading is missing.*

   Response: The text headings have been corrected.

5. *Sec 2.1.1: Describe in the text and provide a figure depicting areas that are sprayed.*

   Response: As discussed in our meeting February 15, dust control water trucks cover all paved areas of the plant site. As part of the IM field efforts, truck routes and water application practices were observed for the source areas identified in the work plan to evaluate dust control application practices. Dust control water is periodically applied in all paved areas in the Speiss Handling Area, and the Former Acid Plant Sediment Drying Pads. Because the application is ubiquitous, the area was not delineated on a figure.

6. *Fig. 2-1: The photobase should be removed from the figure since it is of such poor quality. This figure covers nearly the same area as Figure 2-2. Provide a more legible base map, which incorporates Figure 2-1 legend information items into Figure 2-2.*

   Add runoff arrows to the area immediately east of the plant drain inlet.

   To the extent possible, identify boundary lines for common runoff areas. For instance, show how far east of the Contractor's Change House runoff flows toward the ponded area at deficiency 8.

   Response: As described in the response to General Comment 3 above, Figures 2-1 and 2-2 have been combined into one figure with a clearer base map.

   The drain arrows shown on Figure 2-1 are representative of runoff in the plant drain inlet. Runoff from the unpaved area east of the inlet has not been observed.

The figures will be modified to specifically show runoff patterns associated with the Speiss Handling Area. It will not show runoff patterns in areas not affected by the handling of speiss. Only the area north of the railroad tracks are influenced from runoff from the Speiss Handling Area, and runoff at this location is primarily the result of the sediment filled track drain. The proposed plans to repair and replace this drain will eliminate the present runoff from the Speiss Handling Area to the area north and location #8.

7. ***Fig. 2-2:*** *Add the bins located at #10. At #9 in the legend, change "area" to "pad". The numbers contained in the legend should be identified as "Deficiencies". Add to the figure all areas where product-materials are routinely stockpiled. Identify the east-west dashed line at well DH-31.*

   A dashed blue line should be added to indicate the estimated full extent that water ponds, or, if appropriate, change the description for the blue outline to "extent of ponding" in the legend.

   Response: The requested modifications have been made to the figure. The east-west dashed line near DH-31 was a buried plant water pipeline and has now been removed from the figure, since it was an extraneous detail unrelated to surface runoff features.

8. ***Sec 2.2.1.1:*** *Provide a figure of the tank in plan and section view, including dimensions of the tank and secondary containment. Does the secondary containment include a base that slopes toward the sump? What was the depth of water during the test?*

   Response: Exhibits (1&2) showing plan and section views of the primary and secondary containment tanks have been added to the Report. The secondary containment is sloped to the sump. As described in the report, the depth of water during the test was approximately two feet.

9. ***Sec 2.2.2.1, paragraph 2:*** *Explain why the tank was only filled to a two foot depth. The greater the depth of fluid, the more sensitive the testing would be for leak detection.*

   Response: The test was carried out in accordance with the IM work plan which called for filling the tank with 1 to 2 feet of water. The reason more water wasn't added was simply due to the logistical difficulties of hauling larger quantities of water to the tank. An immediate source of fresh water was not available. The test as designed required adding approximately 20,000 gallons of water to the tank. This was considered sufficient for purposes of identifying leakage.

10. ***Sec 2.2.2.2, paragraph 3:*** *Provide a figure showing the test setup similar to that provided for secondary tank test. All level measurement data and fluid removal information for the sump should be provided. A statement, if true, that the sump of the secondary tank is constructed such that leakage from the primary tank would flow directly to it would help support the argument that leakage was not apparent. Each*

0.001 foot change in fluid level in the primary tank would equate to a fluid loss of 12 gallons. Would this leakage on a per day basis from a leak in the primary tank at any location be detected at the secondary tank sump? Explain why. Were any defects in the tank, such as cracks, observed?

Response: A figure has been added showing the set-up for both the primary and secondary containment testing. Detailed plans for the primary and secondary containment structures have also been added to the report. As indicated on the new figures, the sump in the secondary containment is designed to collect any seepage losses from the primary containment tank. It should be noted that seepage from the primary tank was not evaluated by recording water level changes in the secondary containment sump, consequently water level measurements for the sump are not provided on the figure. Instead a fluorescent dye was added to the primary tank, which provided a means of detecting even minor amounts of seepage to the secondary containment. As indicated in the report, no dye was detected in the secondary containment sump. Prior to testing, both the primary and secondary containment structures were drained and inspected for defects. No defects were observed in either of the containment structures

11. ***Pg. 2-13, paragraph 1, last sentence:*** *This pile of coarse sand does not appear to be identified on Figure 2-2. Did this sand appear to be a significant source of sediment in the trench drain? Was the sand placed as a means to control or treat stormwater?*

    Response: The sand pile has been added to Revised Figure 2-1. The sand pile was a source of sediment to the trench drain. The sand was placed at this location as a railroad car stop to prevent collision with the Speiss Handling Area runoff tank and containment system. Additional explanation has been added to the report.

12. ***Pg 2-14, top of page:*** *If available, provide a photo of this gravel and debris. Ponding in this area would seem especially undesirable since it closely coincides with the location of the former Speiss Pit. The area of ponding should be added to Figure 2-2. A photo of the plant water drain inlet and surrounding area should be provided since this is a key feature in the area.*

    Design data and information regarding stormwater flow rates and quantity for the Speiss Handling Area and Pad should be presented with respect to inflow rate and storage of the Containment Tank, Plant Drain Inlet and Plant Water System. At a minimum, this data and information should be prepared for a two year-one hour design storm.

    Response: Photos of the drain have been added to the report, however, the gravel and ponded water within the drain are difficult to see in a photograph because of lighting constraints. As indicated in the photo, there has been no ponding outside of the trench drain. Sedimentation within the drain simply causes some water to back up in the lowest reach of the trench drain. Design data and information regarding stormwater flow rates for the Speiss Handling Area are not very useful information because dust control water accounts for much greater runoff than natural runoff due to storms. Storm water runoff as a result of direct precipitation is a very minor source of runoff in this area. As a result, the proposed design features as presented in the report appropriately address control of the significantly larger source of runoff - dust control water application.

13. *Pg 2-15, Sec 2.3, Bullets: No. 1, tank conveyance pipes leaking into the secondary containment was not mentioned in Section 2.0. Add this at the appropriate location. Confirm the other summary information is also contained in the previous sections of 2.0, and that it is well explained prior to it being summarized. If necessary, add to the text the numbers in the legend on Figure 2-2 so that it is clear what is being summarized. No. 6 appears to not belong in this section. Add summaries for describing 1) water application practices; 2) speiss bins and stockpiles watering practice.*

    Response: The proposed modifications have been added to the report.

14. *Pg 3-5, first paragraph, 8th line: Change south to north.*

    Response: South has been changed to north.

15. ***Table 4-1**: Consider for inclusion as corrective measures 1) reducing the areas needing spraying and 2) better housekeeping practices (e.g., less spillage, tarping).*

    Response: Reduction of the areas for spraying is already addressed in Table 4-1 by the reduction of water application rates and the training of operators. Additional language has been added to the Table to clarify this. Modifications to Speiss Handling house keeping has been added as an option as suggested.

    Speiss Handling Area
    Add as an observed source the spraying of the speiss bins and stockpiles.

    Response: This has been addressed by adding detail to the description of water truck spraying practices (Key Item G).

    Key Item 9 - In the "Observed Source ..." column, "area" should be changed to "pad".

    Response: Area has been changed to Pad as requested.

    Key Item 10 - These bins and highline tracks are not referenced in the text or shown on figure.

    Response: The figure has been modified to more clearly identify the highline tracks and underlying bins. The description has also been added to the text.

    Key Item 15-16 - The description of "Effectiveness ..." needs to include a statement of feasibility.

    Response: A feasibility statement has been added to the Table as suggested.

Former Acid Plant Sediment Drying Area
Key Item 1, 2, 3, 4, 5 - Consider adding covering the area with a PVC geomembrane, or similar material, as a means to temporarily control infiltration and route water from the area.

Response: The PVC cover option has been added to Table 4-1.

Key Item 6 - Photos 25 and 26 suggest that the concrete is beyond repair. As an alternative, a PVC liner, or similar material, could be laid over the area, or the concrete removed and a lift of fine-grained soil added so that evaporation in the soil profile may be used to reduce the amount of infiltration.

Response: The condition of the concrete in Photos 25 and 26 appears to be worse than it actually is. Patching and crack sealant application should be adequate to address infiltration over most of the Former Acid Plant sediment drying area. The primary concern, however, is eliminating ponding due to excessive run-on from water trucks. As noted in the comment other approaches to address the pad have also been added to Table 4-1.

Key Item 7 - Is moving the fill station an option?

Response: Asarco considered moving the location of the water truck fill station to the west of its present location. However, this idea was discarded because the proposed location is unpaved and could present infiltration issues. Furthermore, spilled water in the proposed location could create mud and result in tracking concerns.

16. ***Figure 4-1**: Show drainage flow direction for track drain.*

    Response: A flow direction arrow has been added to the figure as requested.

17. ***Sec 4.1.1, first paragraph**: Evaluate spraying a dust suppressant, such as calcium chloride and tarping as additional measures.*

    Response: Chemical stabilizers, such as latex binders have provided effective barriers on outside storage piles, while magnesium chloride applications have been successful in minimizing fugitive dust from in-plant roadways. Latex binders have not been successful in stabilizing speiss storage piles because of the high porosity of the storage piles and the latex binder's inability to form a surface crust. Magnesium chloride has been used, on a limited basis, for dust suppression on the speiss storage piles but quality control and customers requirements continue to be a concern. Tarping has been successful in controlling fugitive emissions from outside speiss storage piles and will continue to utilized, where appropriate.

18. ***Sec 4.1.5**: Describe criteria to determine if and when a cover and doors will be added.*

Response: As part of Asarco's work plan for the storage of solid mineral processing secondary material, doors were contemplated at the entrances to the highline bins. However, equipment access restrictions and height clearance prevents their installation. Therefore, doors leading into the highline bins will not be installed.

19. *Appendix III, Page 1, Paragraph 1, 5th line: Change "minimize" to "reduce".*

Response: "Minimize" has been changed to "reduce"

20. *Appendix III, Fig 1: Identify P-1 and P-2 in legend.*

Response: This figure has been modified and P-1 and P-2, which were piezometers installed as part of the site RI, have been removed from the Figure.

21. *Appendix III, Section 3.1: Periodic inspections following a pronounced rainstorm would be appropriate as a way to gauge how the runoff/runon at the site is handled. Sheets for the Speiss Handling Area and Former Acid Plant Sediment Drying Area should be prepared which clearly show all drainage related features. A drawing similar to Exhibit 1, Acid Plant Leak Containment Paving Master Plan, contained in the Interim Measures Work Plan is appropriate.*

Response: The observation that inspections should be conducted following a pronounced rainstorm event is valid and has been added to O&M list on Table 3-1; however as previously noted, water truck runoff is the principal source of runoff and infiltration and should be a primary consideration for routine monitoring. Figures showing drainage related features in the Speiss Handling Area and the former Acid Plant Sediment Drying Areas have been added to the O&M plan.

GROUNDWATER SOURCE CONTROL INTERIM MEASURES
DESIGN ANALYSIS, PLANS AND SPECIFICATIONS
EAST HELENA FACILITY

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GROUNDWATER SOURCE CONTROL INTERIM MEASURES
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EAST HELENA FACILITY

1.0 INTRODUCTION

Groundwater Source Control Interim Measures (IM) for the East Helena Facility were evaluated in accordance with the Interim Measures Work Plan for the East Helena Facility (Hydrometrics 1999a).

1.1 SUMMARY OF EXISTING GROUNDWATER QUALITY

Groundwater quality in the plant site area is variable by location and reflects the effects from previously identified source areas. Historically, groundwater on the east half of the plant site is strongly influenced by long-term water quality trends in Lower Lake. Water quality trends on the west half of the plant site have been influenced by the groundwater recharge from on-plant sources (see Figure 1-1) including:

- Infiltration of surface runoff with elevated metals from speiss in the Speiss Handling Area (includes historical impacts from the Former Speiss Settling Pond and Granulating Pit),
- Previous acid and scrubber water spills in the Acid Plant Area (includes the Former Acid Plant Water Treatment Facility Settling Pond), and
- Infiltration of surface runoff through soils with high residual metals in the Former Acid Plant Sediment Drying Area.

The present groundwater quality conditions on the East Helena plant site are depicted in Figures 1-2 through 1-5. These figures (taken from the Supplemental Groundwater Report, Hydrometrics 2000) are isocontour plots of arsenic, cadmium, lead, and zinc for fall 1999 data sets and show:

- Arsenic concentrations in shallow groundwater exceed the 0.050 mg/L MCL on the plant site and in a limited area downgradient of the plant site. Groundwater arsenic concentrations also exceed the State of Montana's WQB-7 human health based standard of 0.020 mg/L. The highest concentrations of arsenic in groundwater originate from the Speiss Handling Area (includes former Speiss Settling Pond and Granulating Pit), the Acid Plant area and the former Acid Plant Sediment Drying Pad.
- Cadmium, lead and zinc concentrations in groundwater are elevated within the immediate plant site area, but remain at or below the limits of detection in East Helena area monitoring wells. Metals concentrations (cadmium, lead, and zinc) are all currently below MCLs in all downgradient wells.

Arsenic has been identified as the primary constituent of concern since it is detected in off-site shallow monitoring wells at concentrations in excess of the drinking water standard.

Arsenic is not elevated in the intermediate and deep aquifers beneath East Helena. Former residential wells in East Helena are primarily completed in the intermediate and deep aquifers. Water at these wells meets water quality standards (with the exception of the St. Clair well which is a shallow, hand-dug well). The private wells in East Helena are no longer in use as potable water supply wells, because the City of East Helena has implemented a well ban in the area serviced by the municipal water supply. Asarco monitors water quality semi-annually in the private wells and monitoring wells in East Helena.

Long-term semi-annual monitoring results show the arsenic plume has advanced very little since the RI period (ten years) due to processes of natural attenuation in downgradient areas. In addition, although arsenic concentrations in groundwater near plant site source areas (see Figure 1-1) remain high, the data from wells at these locations show a declining trend. An exception is well EH-60, located just north of the plant site, where arsenic concentrations have continued to increase.

Most downgradient areas show little or no change, apparently due to seepage effects from Prickly Pear Creek and a corresponding increase in the oxidation state of groundwater. An exception is well EH-60, located just north of the plant site, where arsenic concentrations have increased over time, but recently shown indications of a leveling or decreasing trend. The effect of oxidation state in downgradient wells is evident from dissolved oxygen concentration data. For example, there is a five-fold increase in dissolved oxygen concentrations between EH-60 and EH-62 and a corresponding decrease in arsenic concentrations. The decrease in arsenic concentration is coincident with a change from arsenic (III) dominant to arsenic (V) dominant conditions, large decreases in iron and manganese concentrations, and increases in dissolved oxygen concentrations. This is indicative of removal of arsenic by coprecipitation/adsorption with hydrous iron oxides/hydroxides in response to the increasing oxidation state in groundwater.

1.2 SOURCE CONTROL DESIGN REPORT SCOPE

As described in the Work Plan, Interim Measures for East Helena Facility groundwater are divided into two general categories:

1. Source controls to eliminate or reduce sources of arsenic and metals to groundwater.
2. Migration controls to address the potential for off-site migration that may not be completely addressed by source control measures.

This report addresses source control interim measures only. In accordance with the IM Work Plan schedule, migration control interim measures will be addressed, if necessary, in subsequent documents to be completed during the year 2000.

Groundwater source controls were evaluated and developed for the Speiss Handling Area, Acid Plant, and the Former Acid Plant Sediment Drying Area (see Figure 1-1). As described in the CC/RA (Hydrometrics 1999b) and the IM Work Plan, these areas have been identified as likely sources of arsenic and metals to groundwater, and as areas where additional evaluation was needed to develop and implement interim measures. Source control actions for each identified area consist of evaluation, development, and implementation of interim measures to reduce contributions of arsenic and metals to groundwater. A process schematic for development, design and implementation of groundwater source control interim measures is shown on Figure 1-6.

This report addresses source control IM for the Speiss Handling Area and the Former Acid Plant Sediment Drying Area. Proposed source control interim measures at these areas consist of the elimination or reduction of surface water run-on/runoff. As shown in Figure 1-6, development and implementation of source control interim measures is an iterative process with more immediate controls implemented as discussed in this document. Pending the evaluation of groundwater, soils data, and evaluation of speiss handling practices, additional source control measures may be designed and implemented. Groundwater and subsurface soil data are in the process of being analyzed and evaluated. An evaluation of speiss handling practices is in progress as part of a plant review of certified pad requirements for Phase IV Land Disposal Regulations (LDRs) (ARM 17.54.307).

Interim measures for spill reduction and spill containment in the Acid Plant area are currently being performed in accordance with the Interim Measures Work Plan implementation schedule (Figure 7-1-2 of the IM Work Plan). Acid Plant Interim Measures were initiated in year 1999 and will continue through the year 2000. The major components of these actions include:

- Replacement of the sulfuric acid conveyance line (1010 pipeline) from the acid pump tank building to the acid storage tanks;

- Installation of a new sulfuric acid pipeline from the new acid transfer station to the 98% acid storage tank;
- Reconstruction of the scrubber water distribution system spray heads and distribution system;
- Installation of pH meters in the acid and scrubber water heat exchanger circuits;
- Increased inspections of the sulfuric acid conveyance, scrubber water distribution system, acid heat exchanger circuit, scrubber water heat exchangers, and spill containment features;
- Construction of a catchment basin, drain channel, and new concrete pad in the vicinity of the pump tank building;
- Construction of new concrete pad in the area around the 98% acid storage tank;
- Construction of a new 98% acid loadout facility equipped with a new stainless steel acid spill containment rail car pan; and
- Construction of a concrete catchment sump, stainless steel spill catchment rail car pans, hydrogen peroxide spill catchment rail car pan, and new concrete in the acid storage and loading area.

These activities are fully described in monthly progress reports submitted to EPA.

2.0 SPEISS HANDLING AREA IM EVALUATION

In accordance with the IM Work Plan (Section 4.1.1.1) additional data were collected in the Speiss Handling Area during September and October of 1999 to 1) examine speiss handling procedures, 2) assess surface runoff conditions, and 3) determine the integrity of runoff containment and conveyances.

The Speiss Handling Area encompasses a central containment pad where speiss may be temporarily stockpiled, as well as paved road areas around the dross plant where the speiss is handled by front end loaders (Figure 2-1). The containment pad where the speiss is sometimes stockpiled has been engineered to collect runoff and contain it in a speiss runoff containment tank. The speiss runoff containment tank has a primary and secondary containment system. Plans and specifications for the speiss runoff collection tank are shown on Exhibits 1 and 2. Trench and track drains have been constructed in perimeter areas to control runoff from areas that may receive speiss spillage.

2.1 SPEISS HANDLING PROCEDURES

Matte and speiss (collectively referred to as speiss) are copper bearing products that are tapped jointly several times each day from the dross reverberatory furnace into an air-mist granulator bin. Once cooled, the speiss is removed from the granulator bin with a front-end loader. The East Helena Plant typically produces 1,000 tons of speiss each month. All of the speiss generated at the Asarco East Helena Plant is shipped to a copper plant for metal recovery.

Currently, a front-end loader moves the cooled speiss from the concrete granulator bin to a concrete, three-sided bin located on a storage pad north of the dross building (Figure 2-1). The speiss remains in the storage bin for approximately one-day while awaiting quality control analyses. If the speiss meets quality control specifications, it is screened on the same storage pad to separate the fine from the coarse material. Otherwise, the off-specification speiss is returned to the dross plant for re-processing.

The fine speiss material is either loaded into a railcar for immediate shipment or placed onto a concrete storage pad in the lower ore storage area for storage. The oversized speiss is moved from the storage pad north of the dross plant by front-end loader to either the lower ore storage area or inside the concentrate storage and handling building. The oversized speiss is crushed inside the concentrate storage and handling building and either loaded into a railcar for immediate shipment or placed onto a concrete storage pad in the lower ore storage area for storage.

The speiss that is being stored in the lower ore storage area can remain at this location for extended periods of times while awaiting shipment. Asarco utilizes control measures, such as placing plastic covers over the stockpiled speiss that has been stored in the lower ore storage area, to minimize environmental impacts.

In the near future, Asarco intends to improve its handling of speiss by discontinuing the use of the storage pads north of the dross building and making use of either indoor storage or Phase IV certified storage pads (storage pad locations are presented on a Figure in Section 4-1). On or before September 11, 2000 (effective date of the Phase IV storage requirements for solid mineral processing secondary materials), Asarco will manage speiss by first placing it in Phase IV certified storage pads located in the highline bins. From there, the speiss will be screened in the existing speiss load-out building located west of the dross building. The fines will be either loaded into a railcar for immediate shipment or placed onto a Phase IV certified pad west of the concentrate storage and handling building for storage. The oversized speiss will be moved from the Phase IV certified highline storage pads by front-end loader to the concentrate storage and handling building. The oversized speiss will be crushed inside the concentrate storage and handling building and loaded into a railcar for immediate shipment, placed on a Phase IV certified concrete storage pad west of the concentrate storage and handling building, or stored inside containment buildings while awaiting shipment.

2.2 ASSESSMENT OF SURFACE WATER RUNOFF PATTERNS

The CC/RA report for the Asarco East Helena Facility (Hydrometrics, 1999b) identified surface runoff in the Speiss Handling Area and runoff collection in associated containment facilities as potential continuing sources of arsenic to groundwater. A detailed inspection was conducted in the Speiss Handling Area as part of this IM investigation to identify conditions that could potentially result in runoff infiltration and adverse impacts to shallow groundwater. The following issues were examined:

1. Water application practices in the Speiss Handling Area related to dust control;
2. Surface water runoff patterns and the potential for infiltration in unpaved areas;
3. Condition of surface paving and runoff conveyances.

As discussed in Section 1.0, groundwater and subsurface soil data have been collected in the Speiss Handling Area as part of this investigation and are in the process of being analyzed. The speiss handling practices are also being evaluated as part of certified pad requirements for Phase IV Land Disposal Regulations (LDRs) (ARM 17.54.307). The need for additional source control interim measures will be reviewed based on the additional findings from these investigations.

2.2.1 Water Application Practices

Water trucks apply water throughout the plant site on a regular basis for dust control. This practice is required under the Lead SIP (State Implementation Plan) for air quality purposes. Water applied by the water trucks for dust suppression is the primary source of surface water runoff. A water balance analysis presented in the CC/RA estimates that water use for dust control averages approximately 45 gpm (Hydrometrics, 1999a). The amount of water applied on any given day varies greatly depending on temperature and wind conditions. During warm weather, water trucks may make one to two dozen passes through the plant site on a daily basis. The application rates vary depending on how the water is applied. Each water truck is equipped with a combination of spray nozzles on the sides and rear of the truck and a separate directional sprayer. A flow rate of approximately 150 gpm was measured from the rear nozzle of one water truck during testing of the speiss runoff containment tank.

The trucks generally run with the nozzles wide open, which can produce significant amounts of runoff. During this investigation, the water trucks were often observed to stop and spray the stockpiles of speiss stored in the Speiss Handling Area. This action produced large quantities of runoff from the stockpiles. The spray also displaced some speiss outside of the containment pad. While storm water controls have been designed to contain surface runoff in the Speiss Handling Area, high application rates increase the potential for infiltration. Patterns of water application and application rates need to be modified to minimize runoff from speiss stored in this area. Specific recommendations are provided in Section 4.0 of this report.

2.2.2 Surface Runoff Patterns

Figure 2-1 shows surface runoff patterns in the Speiss Handling Area and adjacent unpaved areas. As previously noted in Section 2.1, stockpiles of speiss are temporarily stored on an open concrete pad, which drains through runoff conveyance pipes to a runoff containment system that includes a primary tank placed within a concrete secondary containment unit (see Figure 2-1 and Exhibit 1). With the exceptionof a few areas described in the following section and noted in Figure 2-1, runoff in the central portion of the Speiss Handling Area appears to be well contained.

Speiss is also present in peripheral areas to the central containment pad due to spillage by the front end loaders and vehicle tracking. Spillage was particularly evident in the area behind the speiss bins and in the vicinity of the speiss loadout facility. A portion of the runoff from the loadout area drains north along the railroad tracks and discharges to an unpaved track area near the contractor changehouse (see locations 7 & 8 in Figure 2-1, and photos 6 & 10 in Appendix A). A small track drain in the Speiss Handling Area is intended to intercept this drainage (see location 6 in Figure 2-1). However, this drain is prone to sediment plugging and therefore may not always operate effectively. The unpaved track area running along the eastside of the Speiss Handling Area also receives some runoff, primarily from the paved area to the east. There is one location in particular where runoff is channeled into this unpaved track area, and evidence of ponding and infiltration is present (see location 2 in Figure 2-1, and photo 1 in Appendix A).

Several small ponded areas were also noted in the paved roadway areas and in storage bins that underlie highline tracks on the west boundary of the Speiss Handling Area (see locations 10, 11 & 12 in Figure 2-1). Ponding increases the potential for infiltration through cracks or defects that may be present in the concrete. Drainage improvements recommended in Section 4.0 address surface water runoff in the Speiss Handling Area.

2.2.3 Condition of Surface Paving and Runoff Conveyances

The physical condition and integrity of surface paving and runoff conveyances were inspected in the Speiss Handling Area as part of this investigation. Areas where conditions indicate a potential for infiltration are shown in Figure 2-1. The concrete paving in this area is generally intact, but there are local areas where cracks and potholes are present (locations 5, 10 & 17 in Figure 2-1). The runoff conveyances in the Speiss Handling Area include runoff conveyance pipes to the primary containment tank, and two trench drains designed to capture speiss impacted runoff.

Examination of runoff conveyance pipes from the Speiss Handling Pad to the primary runoff containment tank shows that some leakage around the conveyance pipes to the secondary containment. The location of the runoff containment tanks and conveyance pipes are shown in Figure 2-1 (location 15). A plan showing the general conveyance pipe installation is shown in Appendix B and evidence of leakage around the pipes is shown in photo 13 in Appendix A.

A small trench drain runs beneath the railroad tracks on the northern side of the Speiss Handling Area (location 6 in Figure 2-1, photo 5). This railroad track drain is designed to intercept any runoff from the speiss loadout area. The drain, however, is undersized and is prone to sediment plugging. During the site inspection, the drain was completely filled with sediment and did not intercept runoff.

A second larger trench drain is located below (east of) the speiss runoff containment tank and was also filled with sediment during the drain inspection (see location 1 in Figure 2-1, and photo 18). One source of sediment to this drain was a sand pile rail car stop located near the north end of the trench drain (see location 16 in Figure 2-1 and photo 20). Cracks were noted in the concrete walls and concrete bottom of the drain, which may result in seepage to groundwater. This trench drain was tested for leaks, and test procedures and results are discussed in Section 2.3 of this report.

2.3 RUNOFF CONTAINMENT AND CONVEYANCE TESTING

As described in the IM Work Plan, the primary runoff containment and conveyance facilities in the Speiss Handling Area (the speiss runoff containment tank and perimeter trench drain) were tested for leakage. The speiss runoff containment tank consists of a primary tank and secondary containment. Together these are commonly referred to as the "Speiss Tank". Each of these components were tested separately to determine if leakage is occurring. The field methods and results of testing for each component of the containment and conveyance system are presented in the following sections. Photographs taken during testing of the primary tank, secondary containment and trench drain are included in Appendix A. Construction drawings of the tank system (dated prior to removal of the Speiss Pond, Speiss Pit and Granulating Circuit) are in Exhibits 1 and 2.

2.3.1 Secondary Containment Test

2.3.1.1 Methods

The secondary containment test was initiated on September 13, 1999. The testing plan called for water to be added to the secondary containment during the test. However, due to concerns about floating the interior primary tank if the secondary containment alone was flooded, the decision was made to fill both the primary tank and secondary containment to the same level and monitor water levels in both tanks (see Figure 2-2).

Upper Lake water was added to the primary tank and secondary containment using the plant water truck. The surface water drain lines routing water into the primary tank from the surrounding area were plugged with foam sealant to prevent any runoff from entering the tank during the test. There was initially some leakage of surface water runoff into the secondary containment around the edges of the surface water drain lines (see location 15 in Figure 2-1, photo 13). However, these leaks were successfully sealed off during the test with sheet plastic and foam sealant. For water level measurement purposes, the following equipment was installed in the speiss tank area:

- Staff gages were placed in both the primary tank and in the secondary containment for manual water level measurements.
- A Hermit® datalogger with a 20 psi pressure transducer was installed in the secondary containment sump (located in the southeast corner of the tank) to collect water level measurements at 15-minute intervals.
- An evaporation pan was filled with water and placed in partial shade on the south side of the speiss tank.

Both the primiary and secondary tanks were emptied and cleaned out prior to testing. No surface defects were noted in either containment. While filling the primary tank and secondary containment, air bubbles were noted within the secondary containment emanating from the base of the primary tank, as air trapped in the sand layer beneath the primary tank was displaced by water. In addition, air bubbles were noted on the east side of the barrier in the center of the primary tank, about 12 feet from the north end of the tank. These bubbles were apparent for only a short time, and may have been the result of air escaping from beneath the barrier. Following an overnight equilibration period to allow water level stabilization, the secondary containment was topped off with additional water from the water truck to equalize the water levels in the primary tank and secondary containment. A schemeatic showing the testing procedure is on Figure 2-2.

Manual water level measurements were collected at least twice daily beginning September 14. Measurements included staff gage readings, evaporation pan readings (using both a hook gage and an engineer's tape measure as a secondary check), and manual datalogger readings.

2.3.1.2 Results

No measurable precipitation was recorded during testing of the secondary containment, thus water loss through evaporation was the only variable affecting water levels (other than potential leakage). A total of seven manual water level measurements were collected over a period of four days (Figure 2-3). Although data logger readings were checked in the field and appeared to be consistent with manual readings, when the datalogger was downloaded it became apparent that the datalogger was not producing consistent readings. Further testing showed there were problems with the transducer that resulted in inaccurate readings, therefore the data logger results have not been included in the analysis of secondary containment water levels. Water level trends over the measurement period for the primary tank, the secondary containment, and the evaporation pan are shown on the graph in Figure 2-3.

Water level changes in the evaporation pan, primary tank, and secondary containment tank were all similar. The calculated changes in water level with time (based on linear regressions calculated for the trend lines on Figure 2-3) were as follows:

- -0.011 ft/day (primary tank staff gage);
- -0.012 ft/day (secondary containment staff gage); and
- -0.013 ft/day (evaporation pan).

The observed water level decreases in the primary tank and the secondary containment were virtually identical, and were equal to the observed water level decrease attributable to evaporation. Therefore, results for the secondary containment showed no evidence of detectable leakage to underlying soils and groundwater. At this point in the test, there remained some possibility of leakage if the water levels in the secondary tank were influenced by leakage from the primary containment tank. However, as described in the following section, subsequent testing of the primary containment with a tracer confirmed that the primary tank is not leaking There are still limitations on the minimum leakage rate that would be observable under the conditions of the test. Volume calculations based on the dimensions of the secondary containment indicate 0.01 feet of water level change is equal to approximately 15 gallons. The observed water loss due to evaporation was, therefore, about 15 gallons per day from the secondary containment or about 0.01 gallons per minute. A leakage rate that was a small percentage of this evaporation rate (less than 0.001 gallons per minute, for example) would not be measurable under these conditions. Nevertheless, the correlation of water levels in the primary tank, the secondary containment, and the evaporation pan during this test, do not show any evidence of leakage from the secondary containment.

2.3.2 Primary Tank Test

2.3.2.1 Methods

Following the secondary containment leak test, the water in the secondary containment was pumped out using a vacuum truck, and testing of the primary tank was initiated (see Figure 2-2). Since the sand layer beneath the primary tank had become saturated during the previous test, the secondary containment was pumped out on September 17 and the sand layer was allowed to drain for several days. The secondary containment was pumped out again on September 21. A small amount of water continued to drain from the sand layer into the secondary containment sump throughout testing of the primary tank.

Additional Upper Lake water was added to the primary tank using the plant water truck on September 20. Initial water level readings in the primary tank were collected on September 20 after the tank had been filled with about 2 feet of water. Water level measurements in the primary tank (staff gage readings) and in the evaporation pan were collected as during the secondary containment test (Section 2.3.1.1). The Hermit® datalogger was moved from the secondary containment sump to the primary tank to collect water level data; however, the datalogger results are considered unusable due to unstable datalogger readings as indicated previously.

As an additional check for leakage from the primary tank, a biodegradable fluorescent dye (fluorescein) was added to the primary tank on September 20. The dye served as a tracer to check for leakage from the primary tank into the secondary containment. A sufficient quantity of dye was added to visibly change the color of the water in the tank to a light green. Following a mixing period of several days, samples were collected from the secondary containment sump and checked for fluorescence under a portable ultraviolet (UV) lamp. Samples for fluorescence were collected on September 22 and again on September 24.

2.3.2.2 Results

No measurable precipitation was recorded during testing of the primary tank, thus water loss through evaporation was the only variable affecting water levels (other than potential leakage). A total of eight manual water level measurements were collected over a period of eight days (Figure 2-4). Water level trends over the measurement period for the primary tank and the evaporation pan are shown on the graph in Figure 2-4.

As observed during the previous test of the secondary containment, water level changes in the evaporation pan and primary tank were similar. The calculated changes in water level with time (based on linear regressions calculated for the trend lines on Figure 2-4) were as follows:

- -0.008 ft/day (primary tank staff gage); and
- -0.012 ft/day (evaporation pan).

These results are comparable to the values of -0.011 ft/day for the primary tank and -0.013 ft/day for the evaporation pan observed during the secondary containment test. In addition, none of the samples bailed from the secondary containment following addition of fluorescent dye to the primary tank showed any fluorescence. Even very small amounts of seepage would potentially be evident, since fluorescein is detectable at parts per billion concentrations under ultraviolet light. The dye tracer results are consistent with the water level results and indicate that the primary tank is not leaking.

2.3.3 Perimeter Trench Drain Test

2.3.3.1 Methods

The final phase of testing at the Speiss Handling Area involved the perimeter trench drain that routes surface runoff in the railcar loading area around the speiss tank and into the plant water system. On September 17, Asarco personnel removed the steel plates covering the trench drain and cleared sediment out of the drain along its entire length (about 100 feet) with a vacuum truck. Depth of sediment in the drain ranged from about 3 inches at the upstream end to about 7 inches at the downstream end. Asarco personnel also moved the coarse sand rail car stop that had been placed over the trench drain at the end of the railroad spur line (see Figure 2-1 and Photo 20 in Appendix A).

The work plan called for sealing off 20 foot sections of the trench and testing them individually. Several methods (foam board and various sealant materials) were employed in an attempt to seal sections of the drain for leak testing. However, due to the rough concrete surface and the slightly trapezoidal shape of the trench, forming a watertight seal proved very difficult. After several attempts, the testing method was modified. A representative 4-foot section of trench (about 1.5 feet deep) was sealed using bentonite and foam boards at both ends of the section. Two pieces of foam boards were used to block off each end of the test section and bentonite was poured between the foam boards and hydrated in place (see photo 22 in Appendix A). Following installation of these plugs, the trench section was filled with water and the water depth was measured in the middle of the trench at a marked measuring point. Evaporation pan measurements were collected concurrently with water depth measurements.

The condition of the concrete in the section of the trench drain that was tested appeared to be generally representative of the drain along its length. Although the work plan called for testing each individual section of the trench to evaluate the leakage and assess the need for improvements, only this one section was tested due to the difficulty in sealing off larger sections of the drain.

2.3.3.2 Results

Inspection of the drain after the sediment was cleaned out revealed a number of cracks along its entire length. Cracks were continuous along both sides of the trench and across the trench bottom. In other places, cracking was apparent between the trench and the overlying concrete slab adjacent to the speiss tank (about 2 inches below the lip of the trench). In addition, the downstream end of the drain (where runoff water enters the plant water system, see location 1 on Figure 2-1 and Photo 23 in Appendix A) was dammed with gravel and debris, causing backwater ponding within the downstream end of the trench drain and a very slow drainage rate of the ponded water.

Table 2-1 summarizes water level measurements collected in the trench drain and evaporation pan during the trench drain leak test.

TABLE 2-1. PERIMETER TRENCH DRAIN TEST RESULTS

	Water Level Measurements	
Date and Time	**Trench Drain Water Depth (ft)**	**Evaporation Pan Reading (ft)**
9/29/99 11:00	1.32	0.126
9/29/99 15:40	1.00	0.121
9/30/99 08:20	0.88	0.113
9/30/99 12:00	0.87	0.109
	Total Change in Water Level Relative to Initial Reading (ft)	
9/29/99 15:40	-0.32	-0.005
9/30/99 08:20	-0.44	-0.013
9/30/99 12:00	-0.45	-0.017

The water level change for the evaporation pan during this time period was about -0.014 ft/day; this value is consistent with the values obtained during testing of the primary tank and secondary containment (-0.012 ft/day and -0.013 ft/day, respectively). For the trench drain, the overall average water level change was -0.35 ft/day. However, the water level change in the trench drain was initially quite rapid, with a subsequent decrease in rate. The calculated change in leakage rates over the duration of the test is shown in Table 2-2.

TABLE 2-2. CALCULATED LEAKAGE RATES FOR TRENCH DRAIN TESTING

Time Period	Water Level Decrease Rate	Leakage Rate
9/29/99 -- 11:00 to 15:40	1.65 ft/day	74 gal/day
9/29/99 15:40 to 9/30/99 08:20	0.17 ft/day	7.6 gal/day
9/30/99 -- 08:20 to 12:00	0.065 ft/day	2.9 gal/day

The water level changes in the trench during this test were all well in excess of the observed evaporative changes. When the foam plugs were removed from the trench drain at the conclusion of the test, it became apparent that some of the bentonite had not completely hydrated. Therefore, it is possible that some of the water leaking from the trench may have been absorbed by the bentonite in the plug rather than leaking out through cracks. However, the test was sufficiently long that the bentonite should have sealed itself off over the test period if it was actually exposed to leakage. Thus, observed leakage rates towards the end of the test are considered the most reliable indication of actual leakage rates. Assuming that the seepage rate determined in this test (0.065 ft/day) is representative of leakage along the entire length of the trench, the trench drain would be leaking approximately 73 gallons of water per day. These leakage rates would only be expected if water were backed up in the trench. Prior to testing, water was backed up in the trench due to a thick layer of accumulated sediment in the drain. When the sediment is cleaned out and the trench drains freely, the seepage should be significantly less than predicted by this test.

These test data, along with visual evidence of cracking in the drain, strongly suggest that there is leakage from the drain and that repairs/improvements are necessary. Regular maintenance is also needed to keep the drain free of sediment and prevent water from backing up in the trench.

2.4 SUMMARY OF FINDINGS FOR SPEISS HANDLING AREA

The evaluation of surface runoff conditions in the Speiss Handling Area indicates the following:

1. Runoff in the Speiss Handling Area occurs primarily as a result of dust control water application from water trucks. Water application rates are liberal (about 150 gpm) resulting in periodic (typically daily) runoff throughout the Speiss Handling Area. Water application includes all areas of the Speiss Handling Area including storage pads, roadways, and speiss stockpiles.
2. Testing of the speiss runoff containment tank showed no indication of leakage in either the primary tank or secondary containment (see Figure 2-1, location 15). However, runoff conveyance pipes to the primary tank are in need of repair to prevent discharge to the secondary containment.
3. Sedimentation and leakage occur in the perimeter trench drain adjacent to the speiss runoff containment tank (see Figure 2-1, location 1).
4. Inspection of the concrete pad in the primary containment area showed only a few areas requiring repairs (see Figure 2-1, location 9).
5. Sediment accumulation in the railroad track drain north of the Speiss Handling Area results in surface runoff from the speiss load out area to an unpaved track area near the contractors change house (see Figure 2-1, locations 6, 7 and 8).
6. Surface runoff also occurs to the unpaved track area adjacent to the speiss runoff containment tank. This runoff originates primarily from a paved area outside of the Speiss Handling Area (see Figure 2-1, location 2).

3.0 FORMER ACID PLANT SEDIMENT DRYING AREA IM EVALUATION

In accordance with the IM Work Plan (Section 4.1.1.3) additional data were collected to address:

1. Water application practices;
2. Surface runoff patterns in the former Acid Plant Sediment Drying Area; and
3. Condition of paving and surface water conveyances.

The former Acid Plant Sediment Drying Area is shown in Figure 3-1 and encompasses the former sediment pad and surrounding paved and unpaved areas. The evaluation of surface water runoff patterns is described in this Source Control IM report. As described in Section 2.0, the evaluation of subsurface soil and groundwater in source areas is on-going and the results of this effort was presented in the Supplemental Groundwater Investigation Report dated February 29, 2000. The CC/RA identified the Former Acid Plant Sediment Drying Area adjacent to Lower Lake as an area with particularly high concentrations of arsenic and metals in groundwater. Prior to November 1992, sludge from the former water treatment plant settling pond was dewatered in this area. The concrete pad is no longer used for drying sludges and as a result, arsenic and metals concentrations have been gradually improving in most of the wells in this area. Despite overall water quality improvements, arsenic and metals concentrations remain elevated in this area and there are some localized areas (for example, monitoring well APSD-2) where metals continue to show increasing trends.

3.1 WATER APPLICATION PRACTICES

Water applied for dust suppression is a primary source of surface water run-on to this area. The former sediment drying pad lies immediately east of the water truck fill station, and due to its location, receives regular applications of water. During this investigation, the water trucks were occasionally observed applying water directly to the concrete drying pad. However, most of the time water was just applied on the roadway adjacent to the pad. Water applications typically resulted in surface runoff from the roadways which are all paved and have a visible slope primarily to the east.

In addition to routine spraying from the water trucks, runoff also originates from a water truck fill station immediately west of the former sediment drying pad (see Figure 3-1). Water from Upper Lake is used for dust suppression as required in the Lead SIP. The water is pumped from Upper Lake into the water trucks through an overhead fill pipe at this station. Some water typically spills as the trucks are filled and in many cases there is also overflow once the trucks are full. This area is paved and sloped, and consequently any spillage generates surface runoff towards the former sediment drying pad. Recommendations for modifications to water application practices and fill station procedures are presented in Section 4.0 to minimize potential impacts from dust suppression activities.

3.2 SURFACE RUNOFF PATTERNS

Runoff patterns and unpaved areas are shown in Figure 3-1. The eastward sloping pavement in this area diverts runoff to the former sediment drying pad from the water truck fill station and from paved roadways to the west of the pad. Water routinely ponds on the eastern side of the pad as a result of this run-on (see location 4 on Figure 3-1, photo 24 and 25). As the pad continues to receive surface water runoff, water spills over the pad and ponds in unpaved areas immediately south and east of the pad (locations 1, 2 and 3 on Figure 3-1). Water that does not infiltrate in this unpaved area drains to the north onto the roadway. Of particular concern is an area of ponded water immediately upgradient of monitoring well APSD-2 (location 2 on Figure 3-1). Surface water infiltration in this area may be responsible for the increasing concentration trends observed at this well.

3.3 CONDITION OF SURFACE PAVING AND WATER RUNOFF CONVEYANCES

Although the former sediment drying pad is paved, there are no special surface water conveyances to route or divert surface water runoff from this area. The concrete surface of the former sediment drying pad is in relatively good condition, but there are some areas in poorer condition that provide potential pathways for infiltration (see location 6 on Figure 3-1 and photos 26 & 27 in Appendix A). As previously noted, there are also areas where the surface grade allows ponding to occur. Ponding greatly increases the potential for infiltration through cracks and defects in the pad. Also, surface water, which is allowed to flow off the pad to the north and east, can infiltrate directly to exposed soils in these areas (locations 1 and 3 on Figure 3-1). Potential drainage improvements to address surface run-on/runoff issues in the former Acid Plant Sediment Drying Area are also discussed in Section 4.0.

3.4 SUMMARY OF FINDINGS FOR THE FORMER ACID PLANT SEDIMENT DRYING AREA

The evaluation of surface runoff conditions in the Former Acid Plant Sediment Drying Area indicates following:

1. There is surface water run-on to the former sediment drying pad from adjacent roadways and from the water truck fill station that results in some localized ponding.
2. Runoff from the concrete drying pad also results in localized ponding in adjacent unpaved areas. An area of ponding was noted adjacent to monitoring well APSD-2.
3. Inspection of the concrete pad in the former sediment drying area shows areas of cracking or spalling that are in need of sealing or repair.
4. Water application practices for dust suppression could be improved to minimize run-on to the former Acid Plant Sediment Drying Area.

4.0 SOURCE CONTROL INTERIM MEASURE DESIGN ANALYSIS

Potential sources of arsenic and metals to groundwater were previously shown on Figures 2-1 and 3-1. Based on the evaluation conducted in Speiss Handling Area and the Former Acid Plant Sediment Drying Area, a range of interim measure options were developed. The options were developed with consideration of available technologies, standard design and construction practices, and plant operating practices and dust suppression (Lead SIP) requirements. Future or anticipated activities such as new construction or changes in plant operating practices were also considered. Potential interim measures were then evaluated for effectiveness and technical feasibility, administrative feasibility and costs. The evaluation of the IM source control options is summarized in Table 4-1. Based on this evaluation process, the to-be-implemented list of interim measures for the Speiss Handling Area and Former Acid Plant Sediment Drying Area was developed and is summarized in Table 4-2. Figures 4-1 and 4-2 show proposed drainage improvements in each area.

Sections 4.1 and 4.2, respectively, describe the design of each interim measure for the Speiss Handling Area and the Former Acid Plant Sediment Drying Area. Interim Measures plans and drawings for the proposed drainage improvements are in Appendix B. Operation and Maintenance associated with the interim measures are in the Operation and Maintenance Plan in Appendix C. The Construction Quality Assurance Plan is in Appendix D.

4.1 SPEISS HANDLING AREA INTERIM MEASURES

Descriptions of each of the to-be-implemented interim measures for the Speiss Handling Area are described in the following sections. Plans and drawings for these measures are included in Appendix B. A plan for Operation and Maintenance (O&M) for the interim measures is included in Appendix C. The Construction Quality Assurance Plan is in Appendix D.

Table 4-1 GROUNDWATER INTERIM MEASURES DEVELOPMENT AND EVALUATION SUMMARY

Groundwater Interim Measure Area	Key (1)	Observed Source to Groundwater	Interim Corrective Measure Alternative	Material or Technology/Process Options	Effectiveness and Technical Feasibility	Administrative Feasibility	Costs: Capital Cost	Costs: O&M Cost	Costs: Present Worth	Recommended Option?	Comment
Speiss Handling Area	G	Water truck spraying practices including water application on: - Speiss storage pads - Road traffic areas - Speiss stockpiles and bins.	Reduce water application rates	Training operators to reduce application rates and optimize (reduce) areas that are sprayed.	Technically feasible. Operators will require close supervision.	An on-site training program can be implemented for truck operators to to provide necessary training.		$ 5,000	$ 76,862	Yes	
				Install water mist nozzles on trucks	Technically feasible and potentially effective.	Administratively feasible.	$ 5,000	$ 1,000	$ 20,372	Yes	
				Water truck application timer or deadman switches	Technically feasible and potentially effective.	Administratively feasible. Presents Safety Concerns.	$ 5,000	$ 500	$ 12,686	No	Run-on into the speiss area will be addressed by other water control measures.
			Optimize water application rates and dust suppression plan	Modify truck application routes to reduce areas that are sprayed.	May reduce some of the infiltration.	Administratively feasible.		$1,000	$ 15,372	Yes	
				Fixed mist applicators to eliminate the need for water truck	High maintenance on nozzles. Frequent rate changes. Freezing difficulties during cold months. Lines must be blown out frequently.	An on-site training program can be implemented for truck operators to to provide necessary training.	$ 25,000	$15,000	$ 255,587	No	Run-on into the speiss area will be addressed by other water control measures.
				Control speiss spillage and tarp speiss stock piles (improved house keeping)	Technically feasible. Operators will require close supervision.	An on-site training program can be implemented for truck operators to to provide necessary training.	$ 5,000	$ 5,000	$ 81,862	Yes	
				Use chemical stabilizers such as latex binders or magnesium chloride.	Past use of latex binders have not been successful. Magnesium chloride also had only limited success in past application attempts.	Administratively feasible.		$15,000	$ 230,587	No	Run-on into the speiss area will be addressed by other water control measures.
	1	Leakage through trench drain cracks	Minimize sediment buildup	Routine cleanout of sediment within drain trench	Decreased sediment in trench reduces "head", thereby reducing potential infiltration.	Administratively feasible.		$ 10,000	$ 153,725	Yes	
				Install RR stop to minimize sediment buildup in trench drain	Removal of dirt pile near drain inlet will reduce sedimentation, thereby reducing infiltration.	Administratively feasible.	$ 5,000		$ 5,000	Yes	
			Seal cracks in trench drain	Gelco Insituform, HDPE liner, PVC liner, metal or plastic insert, Xypex or other concrete bonding sealant	Effective and feasible. Sealing liners and inserts to existing concrete may be less effective that sealers.	Administratively feasible.		$ 1,700	$ 26,133	Yes	
				New Concrete Drain	Effective and feasible.	Administratively feasible.	$ 25,000	$ 500	$ 32,686	No	Run-on into the speiss area will be addressed by control of water application rates and other interim measures.
	2	Groundwater Infiltration from Railroad Track Ponding Area	Reduce water application rates (See G above)	(See G above)	Technically feasible. Operators will require close supervision.	An on-site training program can be implemented for truck operators to to provide necessary training.	See G Above	See G Above		Yes	
			Install drain to route runoff from change house area into trench drain	Open channel drain	Effective and feasible.	Administratively feasible.	$ 40,000	$ 1,000	$ 55,372	Yes	
				Closed channel drain	Difficult to keep pipe clean.	May be administratively difficult. Needs to be maintained.	$ 35,000	$ 1,000	$ 50,372	No	Run-on into the speiss area will be addressed by control of water application rates and other interim measures.
			Pave or cover area to include the rail tracks and unpaved areas	Concrete or asphalt paving	Concrete very effective but would shut down tracks to bullion loading during construction. Asphalt does not stand up very well to RR traffic.	Alternative method for bullion loading needs to be identified. Beyond scope of interim measures.	$ 1,350,000	$ 1,500	$ 1,373,059	No	Run-on into the speiss area will be addressed by control of water application rates and other interim measures.
	3	Surface runoff infiltration through spillage from speiss loadout area	Reduce water application rates (See G above)	(See G above)	Technically feasible. Operators will require close supervision.	Additional duties for plant water truck operator is administratively	See G Above	See G Above		Yes	

Table 4-1 GROUNDWATER INTERIM MEASURES DEVELOPMENT AND EVALUATION SUMMARY

Groundwater Interim Measure Area	Key (1)	Observed Source to Groundwater	Interim Corrective Measure Alternative	Material or Technology/Process Options	Effectiveness and Technical Feasibility	Administrative Feasibility	Costs: Capital Cost	Costs: O&M Cost	Costs: Present Worth	Recommended Option?	Comment
						difficult.					
			Run-on control to keep water from entering the speiss load out area	Permanent berm (Concrete speed bump, asphalt not effective under heavy use.)	Effective and Feasible.	Interference with loadout equipment limit the compatability with plant operations.	$ 10,000	$ 500	$ 17,686	No	Run-on into the speiss area will be addressed by control of water application rates.
				Temporary berm (roadmix, lime rock)	Will not last under plant operation conditions.	May be administratively difficult. Needs to be maintained.	$1,000	$ 2,000	$ 31,745	No	Run-on into the speiss area will be addressed by control of water application rates.
				Open channel (Concrete v-drain, asphalt v-drain not effective under heavy use.	Technically feasible. Potentially effective. May build up sediment and ice in cold weather.	May be feasible pending review of speiss handling procedures as part of Certified Pad Requirements for Phase IV LDRs per ARM 17.54.307 to be completed by summer 2000.	$ 10,000	$ 500	$ 17,686	No	Run-on into the speiss area will be addressed by control of water application rates.
	4	Surface water runoff through spillage from west speiss bins	Reduce water application rates (See G above)	(See G above)	Technically feasible. Operators will require close supervision.	Additional duties for plant water truck operator is administratively difficult.	See G Above	See G Above		Yes	
			Run-on control to keep water from entering the speiss load out area	Permanent berm (Concrete speed bump, asphalt not effective under heavy use.)	Effective and feasible.	May be feasible pending review of speiss handling procedures as part of Certified Pad Requirements for Phase IV LDRs per ARM 17.54.307 to be completed by summer 2000.	$ 10,000	$ 500	$ 17,686	No	Run-on into the speiss area will be addressed by control of water application rates.
				Temporary berm (roadmix, lime rock)	Will not last under plant operation conditions.	May be administratively difficult. Needs to be maintained.	$ 1,000	$ 2,000	$ 31,745	No	Run-on into the speiss area will be addressed by control of water application rates.
				Open channel (Concrete v-drain, asphalt v-drain not effective in heavy use area.)	Technically feasible. Potentially effective. May build up sediment and ice in cold weather.	May be feasible pending review of speiss handling procedures as part of Certified Pad Requirements for Phase IV LDRs per ARM 17.54.307 to be completed by summer 2000.	$ 10,000	$ 500	$ 17,686	No	Run-on into the speiss area will be addressed by control of water application rates.
	5, 12, 17	Infiltration of surface water through potholes and cracks in pavement at roadways and at the scrap conveyor by the charge building	Reduce water application rates (See G above)	(See G above)	Technically feasible. Operators will require close supervision.	Additional duties for plant water truck operator is administratively difficult.	See G Above	See G Above		Yes	
			Patch pavement	Patch hole at speiss granulation pit roadway, concrete patch at scrap conveyor area, patch asphalt west of dross plant building.	Effective	Administratively feasible.	$ 50,000	$ 1,000	$ 65,372	Yes	
			Overlay existing pad with concrete	Provide concrete overlay (sand and liner between existing concrete and overlay.)	Effective and Feasible.	Administratively feasible.	Not Calculated			No	Run-on into the speiss area will be addressed by control of water application rates.
			New Pavement	New asphalt at roadway west of dross plant. Asphalt may be effective in lightly use area.	Effective	Administratively feasible.	$ 150,000	$ 1,000	$ 165,372	No	Run-on into the speiss area will be addressed by control of water application rates.
	6, 7	Plugged Railroad Track Drain. The plugged drain allows water to runoff down the paved portion of the track north to an unpaved portion of tracks where infiltration occurs.	Reduce water application rates (See G above)	(See G above)	Technically feasible. Operators will require close supervision.	Additional duties for plant water truck operator is administratively difficult.	See G Above	See G Above		Yes	
			Periodic inspection and cleanout of existing drain	Routine cleanout of sediment drain	Drain may be sized too small	May be administratively difficult.		$ 2,000	$ 30,745	Yes	

Table 4-1 GROUNDWATER INTERIM MEASURES DEVELOPMENT AND EVALUATION SUMMARY

Groundwater Interim Measure Area	Key (1)	Observed Source to Groundwater	Interim Corrective Measure Alternative	Material or Technology/Process Options	Effectiveness and Technical Feasibility	Administrative Feasibility	Costs: Capital Cost	Costs: O&M Cost	Costs: Present Worth	Recommended Option?	Comment
			Replace existing drain with a larger drain that is less susceptible to sediment blocking	Open channel trench (Concrete V-trench or U-trench)	Technically feasible and effective.	Administratively feasible.	$ 15,000	$ 1,000	$ 30,372	Yes	
				Closed channel (Concrete or metal culvert)	Difficult to know when to clean. Inlet position critical for proper drainage.	May be administratively difficult. Needs to be maintained.	$ 15,000	$ 1,000	$ 30,372	No	Run-on into the speiss area will be addressed by control of water application rates.
			Expand pavement area to include the rail road tracks and unpaved areas	Concrete or asphalt paving. Asphalt may be effective in this lightly used area	May be beyond scope of interim measures.	Administratively feasible.	See cost for "Speiss2" above			No	Run-off from the speiss area to unpaved portions of the railroad track are addressed by control of water application rates and other interim measures.
	8	Ponding along railroad tracks near wells DH-12, DH-13 and DH-18.	Reduce water application rates (See G above)	(See G above)	Technically feasible. Operators will require close supervision.	Additional duties for plant water truck operator is administratively difficult.	See G Above	See G Above		Yes	
	9	Speiss handling pad: Infiltration of surface water runoff through cracks and potholes in concrete.	Reduce water application rates (See G above)	(See G above)	Technically feasible. Operators will require close supervision.	Additional duties for plant water truck operator is administratively difficult.	See G Above	See G Above		Yes	
			Installation of curbs to keep run off out of the speiss handling area	Permanent berm (Concrete or asphalt)	Technically feasible. Potentially effective.	May be feasible pending review of speiss handling procedures as part of Certified Pad Requirements for Phase IV LDRs per ARM 17.54.307 to be completed by summer 2000.	$ 7,500	$ 500	$ 15,186	No	Run-on into the speiss area will be addressed by control of water application rates and other interim measures.
				Temporary berm (roadmix, lime rock)	Will not hold up under plant operations.	May be administratively difficult. Needs to be maintained.	$1,000	$ 2,000	$ 31,745	No	The measure is not long-lasting or effective because it is easily disturbed by plant operations.
			Repair existing pad in speiss handling area	Patch pot hole (sawcut, patch and waterstop joints)	Technically feasible. Potentially effective.	Administratively feasible.	$ 3,000	$ 500	$ 10,686	Yes	
				Seal cracks	Technically feasible. Potentially effective.	Administratively feasible.	$ 2,000	$ 500	$ 9,686	Yes	
				Asphalt Cover	Technically feasible. Potentially effective. Asphalt may not be effective in high use area.	May be feasible pending review of speiss handling procedures as part of Certified Pad Requirements for Phase IV LDRs per ARM 17.54.307 to be completed by summer 2000.	$ 50,000	$ 1,000	$ 65,372	No	Run-on into the speiss area will be addressed by control of water application rates and other interim measures.
			Overlay existing pad with concrete	Provide concrete overlay (sand and liner between existing concrete and overlay)	Effective and Feasible.	May be feasible pending review of speiss handling procedures as part of Certified Pad Requirements for Phase IV LDRs per ARM 17.54.307 to be completed by summer 2000.	Not Calculated			No	Run-on into the speiss area will be addressed by control of water application rates and other interim measures.
	10	Surface water runoff into and from bins under the highline R.R. tracks	Reduce water application rates (See G above)	(See G above)	Technically feasible. Operators will require close supervision.	Additional duties for plant water truck operator is administratively difficult.	See G Above	See G Above		Yes	
			Runoff containment berm along entrance to bins.	Permanent berm of asphalt or concrete	Should stop run-on to the bins.	May be feasible pending review of speiss handling procedures as part of Certified Pad Requirements for Phase IV LDRs to be completed by summar	$ 60,000			Yes	

Table 4-1 GROUNDWATER INTERIM MEASURES DEVELOPMENT AND EVALUATION SUMMARY

Groundwater Interim Measure Area	Key (1)	Observed Source to Groundwater	Interim Corrective Measure Alternative	Material or Technology/Process Options	Effectiveness and Technical Feasibility	Administrative Feasibility	Costs: Capital Cost	Costs: O&M Cost	Costs: Present Worth	Recommended Option?	Comment
						2000.					
			Seal bin floors	Patch holes	Should stop infiltration.	Administratively feasible.		$ 1,700	$ 26,133	No	Infiltration will be addressed through other interim measures (repaving & runoff containment berms)
				Seal cracks	Should stop infiltration.	Administratively feasible.		$ 2,000	$ 30,745	No	
			Cover bins	Tin or fiberglass roofing material	Should stop rainfall from entering bins.	Access restrictions and necessary clearance height for loaders make roof and door options infeasible.	$ 20,000	$500	$ 27,686	No	Infiltration will be addressed through other interim measures (repaving & runoff containment berms)
			Add doors to front of bins	Roll up, garage door, or barn door	Should limit dust suppression water and rain water from entering bins.		$ 17,500	$500	$ 25,186	No	
			New paved bin floors graded to front of bins	Concrete or asphalt paving 21 storage bins	Technically feasible. Roadway may need to be graded to direct water away from bins.	Administratively feasible.	$ 160,000	$1,000	$ 175,372	No	Infiltration will be addressed through other interim measures (repaving & runoff containment berms)
			New paved bin floors graded to front of bins	Concrete or asphalt paving 8 storage bins	Technically feasible. Roadway may need to be graded to direct water away from bins.	May be feasible pending review of speiss handling procedures as part of Certified Pad Requirements for Phase IV LDRs to be completed by summar 2000.	$ 60,000	$1,000	$ 75,372	Yes	
	13	Rail road crossing: Infiltration of surface water runoff through unpaved crossing	Reduce water application rates (See G above)	(See G above)	Technically feasible. Operators will require close supervision.	Additional duties for plant water truck operator is administratively difficult.	See G Above	See G Above		Yes	
			Expand pavement to include crossing.	Concrete or asphalt paving	May be beyond the scope of interim measures.	Administratively feasible.	See cost for "Speiss2" above			No	Run-off from the speiss area to unpaved portions of the railroad track are addressed by control of water application rates and other interim measures.
	14	Surface water runoff through spillage from east speiss bins	Reduce water application rates (See G above)	(See G above)	Technically feasible. Operators will require close supervision.	Additional duties for plant water truck operator is administratively difficult.	See G Above	See G Above		Yes	
	15-16	Speiss tank inlet pipes: Runoff pipes from the speiss handling area leaks to the secondary containment.	Repair or replace pipes to speiss tank	Gelco Insituform, slip lining or expansion boot with concrete repair to provide a tight seal between concrete and pipe wall.	Technically Feasible. A sealed water tight trench drain will significantly reduce or eliminate infiltration from the drain to ground water.	Administratively feasible.	$ 5,000		$ 5,000	Yes	

Groundwater Interim Measure Area	Key (1)	Observed Source to Groundwater	Interim Corrective Measure Alternative	Material or Technology/Process Options	Effectiveness and Technical Feasibility	Administrative Feasibility	Costs: Capital Cost	Costs: O&M Cost	Costs: Present Worth	Recommended Option?	Comment
Acid Plant Sediment Drying Area	1,2 3,4 5	Runoff runs off the sediment drying pad area to unpaved areas.	Reduce water application rates (See Water Truck Spray above).	(See G above)	Should reduce infiltration	May be administratively difficult.	See G Above	See G Above		Yes	
			Runoff control	Permanent speed bump type of concrete or asphalt.	Could cause large pond on pad.	Administratively feasible.	$ 16,000	$ 500	$ 23,686	No	Run-on into the pad area will be addressed by control of water application rates and other interim measures.
				Temporary speed bump type (Lime rock, roadmix)	Could cause large pond on pad.	Administratively feasible.	$ 1,000	$ 2,000	$ 31,745	No	Run-on into the pad area will be addressed by control of water application rates and other interim measures.
				Open channel (Concrete v-drain, PVC lined v-drain)	Technically feasible. Potentially effective.	Not appropriate as an interim measure because the pad will be more completely addressed as part of the RFI.	$ 50,000	$500	$ 57,686	No	Run-on into the pad area will be addressed by control of water application rates and other interim measures.
				Closed channel (Culvert or pipe)	Technically feasible. Difficult to maintain. May not function properly.	May be administratively difficult.	$ 75,000		$ 75,000	No	Run-on into the pad area will be addressed by control of water application rates and other interim measures.
			Run-on control	Permanent speed bump type of concrete or asphalt)	Technically feasible. Potentially effective.	Administratively feasible.	$ 16,000	$ 500	$ 23,686	Yes	
				Temporary speed bump type (Lime rock, roadmix)	Technically feasible. Potentially effective. Limited life.	Administratively feasible.	$ 1,000	$ 2,000	$ 31,745	No	Run-on into the pad area will be addressed by control of water application rates and other interim measures.
				Open channel (Concrete v-drain, PVC lined v-drain)	Technically feasible. Potentially effective.	Not appropriate as an interim measure because the pad will be more completely addressed as part of the RFI.	$ 50,000	$ 500	$ 57,686	No	Run-on into the pad area will be addressed by control of water application rates and other interim measures.
				Closed channel (Culvert or pipe)	Technically feasible. Difficult to maintain. May not function properly.	May be administratively difficult.	$ 75,000		$ 75,000	No	Run-on into the pad area will be addressed by control of water application rates and other interim measures.
	6	Leakage through the APSD Pad: Seepage through cracks, potholes, and concrete spall locations	Reduce water application rates (See Water Truck Spray above).	(See G above)	May reduce infiltration.	May be administratively difficult.	See G Above	See G Above		Yes	
			Repair existing pavement	Crack sealer and patch holes	Technically feasible. Potentially effective.	Administratively feasible.	$ 40,000	$ 1,000	$ 55,372	Yes	
				Asphalt cap	Technically feasible. Potentially effective. Asphalt may not be effective in high use area.	Not appropriate as an interim measure because the pad will be more completely addressed as part of the RFI.	$ 225,000	$ 1,000	$ 240,372	No	Run-on into the pad area will be addressed by control of water application rates and other interim measures.
			New APSD Pavement	Concrete or Asphalt	Technically feasible. Potentially effective. Asphalt may not be effective in high use area.	Not appropriate as an interim measure because the pad will be more completely addressed as part of the RFI.	$ 950,000	$ 1,000	$ 965,372	No	Run-on into the pad area will be addressed by control of water application rates and other interim measures.
			Temporary Cover	PVC Liner	Technically feasible. However, the liner would not be effective if the pad remains in use for storage of materials.	May not be administratively feasible because of the periodic need for storage space in the area.	$ 20,000	$ 20,000	$ 327,449	No	Run-on into the pad area will be addressed by control of water application rates and other interim measures.
	7	Run-on from fill station and road	Eliminate run-on from water	Personnel training and execution of	Technically feasible. Potentially	Technically feasible. Operators		$ 5,000	$ 76,862	Yes	

Table 4-1 GROUNDWATER INTERIM MEASURES DEVELOPMENT AND EVALUATION SUMMARY

Groundwater Interim Measure Area	Key (1)	Observed Source to Groundwater	Interim Corrective Measure Alternative	Material or Technology/Process Options	Effectiveness and Technical Feasibility	Administrative Feasibility	Costs: Capital Cost	Costs: O&M Cost	Costs: Present Worth	Recommended Option?	Comment
		adjacent to former acid plant sediment drying area.	station	proper water fill measures to eliminate spills.	effective if strictly adhered to.	will require close supervision.					
				Auto-shutoff switch to prevent overflow during filling	Should limit run-on to pad and prevent overflows during water truck tank filling.	Administratively feasible.	$ 5,000		$ 5,000	Yes	
			Route spill water away from pad areas	Options same as run-on control in "5" above			See 5 above	See 5 above		Yes	

Note: 1. "G" denotes water management practices at all locations.
Location number keyed to Figures 4-1 and 4-2.

Table 4-2 SUMMARY OF PROPOSED GROUNDWATER INTERIM MEASURES

Groundwater Interim Measure Area	Location Key (1)	Observed Source to Groundwater	Interim Corrective Measure Alternative	Material or Technology/Process Options
Dust Control - Water Appliccation Management Practices.	G Addresses all locations In the Speiss Handling Area (Locations 1 through 17) and the Former Acid Plant Sediment Drying Area (Locations 1 through 6)	Water truck spraying practices	Reduce water application rates	Training operators to reduce application rates
				Install water mist nozzles on trucks
			Optimize water application rates and dust suppression plan	Modify truck application routes
				Control speiss spillage and tarp speiss stock piles (improved house keeping)
Speiss Handling Area	1	Leakage through trench drain cracks	Minimize sediment buildup	Routine cleanout of sediment within drain trench
				Install RR stop to minimize sediment buildup in trench drain (covered sand barrel type)
			Seal cracks in trench drain	Gelco Insituform, HDPE liner, PVC liner, metal or plastic insert, Xypex or other concrete bonding sealant
	2	Groundwater Infiltration from Railroad Track Ponding Area	Install drain to route runoff from change house area into trench drain	Open channel drain
	5, 12, 17	Infiltration of surface water through potholes and cracks in pavement at roadways and at the scrap conveyor by the charge building	Patch pavement	Patch hole at speiss granulation pit roadway, concrete patch at scrap conveyor area, patch asphalt west of dross plant building.
	6, 7	Plugged Railroad Track Drain. The plugged drain allows water to runoff down the paved portion of the track north to an unpaved portion of tracks where infiltration occurs.	Periodic inspection and cleanout of existing drain	Routine cleanout of sediment drain
			Replace existing drain with a larger drain that is less susceptible to sediment blocking	Open channel trench (Concrete V-trench or U-trench)

Table 4-2 SUMMARY OF PROPOSED GROUNDWATER INTERIM MEASURES

Groundwater Interim Measure Area	Location Key (1)	Observed Source to Groundwater	Interim Corrective Measure Alternative	Material or Technology/Process Options
	9	Speiss handling area: Infiltration of surface water runoff through cracks and potholes in concrete.	Repair existing pad in speiss handling area	Patch pot hole (sawcut, patch and waterstop joints) Seal cracks
	10	Surface water runoff into and from bins under the highline R.R. tracks	Repave bin floors	Construct new pads per Phase IV LDR requirements
			Runoff control	Construct berms at entrance to bins
	15-16	Speiss tank inlet pipes: Runoff pipes from the speiss handling area leaks to the secondary containment.	Repair or replace pipes to speiss tank	Gelco Insituform, slip lining or expansion boot with concrete repair to provide a tight seal between concrete and pipe wall.
Acid Plant Sediment Drying Area	1,2 3,4 5	Runoff runs off the sediment drying pad area to unpaved areas.	Run-on control	Permanent speed bump type of concrete or asphalt)
	6	Leakage through the APSD Pad: Seepage through cracks, potholes, and concrete spall locations	Repair existing pavement	Crack sealer and patch holes
	7	Run-on from fill station and road adjacent to former acid plant sediment drying area.	Eliminate run-on from water station	Personnel training and execution of proper water fill measures to eliminate spills. Auto-shutoff switch to prevent overflow during filling

Note: 1. "G" denotes water management practices at all locations.
Location number keyed to Figures 4-1 and 4-2.

4.1.1 Water Truck Spraying Practices

As described in Section 2.1, water application practices at the plant may be contributing to surface water runoff problems at the plant. As Table 4-2 suggests, these practices can be improved by: 1) reducing overall water application rates, 2) optimizing water application practices specific to areas of concern and 3) tarping outside storage piles to limit need for dust control water on the piles.

As explained in Section 2.1, the nozzles currently in use on the water trucks appear to apply too much water. In response to this observation, Asarco proposes to evaluate various nozzle designs that will allow the site to be watered for dust control without producing such large volumes of runoff water. Once an appropriate nozzle design is selected, its satisfactory use will be verified with field trials. These trials will help to ensure that adequate dust control is being provided for the plant.

In addition to reducing the overall application rate of water, application practices will be reviewed with site personnel. Site personnel will be instructed on the need to limit application of dust control water to stockpile surfaces in the Speiss Handling Area while ensuring that traffic areas are adequately watered.

4.1.2 Leakage Through Trench Drain Cracks

As described in Section 2.3.3.2, the large trench drain that is located east of the speiss runoff collection tank may be contributing to groundwater infiltration in the Speiss Handling Area. As Table 4-2 suggests, drain performance can be improved by: 1) sediment removal, 2) better O&M practices, and 3) repair or sealing of the trench drain surfaces.

Any sediment removed from the drain will be managed at the Truck Wash Dump Station in accordance with Asarco's "Procedure for Management of Sludges at the Truck Wash Dump Station".

Future operation of the trench drain will include maintenance and cleaning in accordance with procedures included in the Interim Measures O&M Plan contained in Appendix C.

Repair and sealing of the trench drain will be accomplished using products similar to those recently used in the plant pump house. Floors, walls, and other flat surfaces in the pumphouse were waterproofed with Xypex ®, a portland cement based product that contains silica sand and various proprietary chemicals. Xypex ® waterproofs by crystallization within the pores of the concrete, having the advantage of providing the water barrier within the concrete itself where it is safe from damage by impact or abrasion. Open cracks and joints were repaired using Xypex ® Patch'n Plug. This fast setting, non-shrink hydraulic cement is suitable for concrete repairs and can even be used in areas with flowing water.

4.1.3 Groundwater Infiltration from Railroad Track Ponding Area

As described in Section 2.2, a portion of runoff from the speiss loadout facility drains north along the railroad tracks and ponds in an unpaved area near the contractor change house. As Table 4-2 suggests, control of runoff from this area can be improved by: 1) reducing the application rate of dust control water, as described above in 4.1.1 and 2) construction of a new drain to intercept runoff from the change house area and divert it to the existing trench drain. The design of this drain is shown on plans contained in Appendix B.

4.1.4 Infiltration to Surface Water Through Potholes and Cracks in Pavement

As described in Section 2.2.3, surface paving in the Speiss Handling Area was found to contain local areas of cracks and potholes that may contribute to groundwater infiltration. As Table 4-2 suggests, control of runoff can be improved by: 1) reducing the application rate of dust control water as described above in 4.1.1 and 2) patching or sealing of pavement surfaces.

4.1.5 Surface Water Runoff into or from Bins under Highline Railroad Tracks

The open bins under the railroad tracks may contribute to runoff problems at the plant. As Table 4-2 suggests, protection of the bins from runoff water can be improved by: 1) reducing the application rate of dust control water, as described above in 4.1.1, 2) repaving the bin floors, and adding a paved berm at the entrance to the bins for runoff control.. As Table 4-1 shows, equipment access restrictions and height clearance prevents installation of doors on the bins.

The initial design for repair of pavement potholes, cracks, and other surface defects in the bin floors will be in accordance with appropriate standards such as the Portland Cement Association's *Concrete Slab Surface Defects: Causes, Prevention, Repair* manual.

4.1.6 Speiss Runoff Collection Tank Inlet Pipes

Because the inlet pipes to the speiss tank were not provided with pipe boots during construction, there is minor leakage of runoff water into the secondary containment. As Table 4-2 suggests, pipe boots that both seal the inlet pipes and seal to the inside face of the speiss tank will help ensure that the inlet lines do not leak into the secondary containment. Plans and specifications for sealing the inlet pipes are in Appendix B.

4.1.7 Modification of Speiss Handling Practices

On December 17, 1999, the State of Montana adopted the Phase IV Land Disposal Restrictions (LDR's) for the storage of solid mineral processing secondary materials. ARM 17.54.307. These regulations will become effective on September 11, 2000. Asarco proposes to meet the storage requirements through the use of buildings, containers, and certified pads.

Solid mineral processing secondary materials resting on pads must meet minimum design criteria, as prescribed by the regulations. The design criteria that have been established in the preamble to the Phase IV regulations (Units Eligible for Conditional Exclusion and Conditions Attached to Such Units) requires that;

- Pads must be designed of non-earthen material which are compatible with the chemical nature of the mineral processing secondary material being stored,
- Pads must be capable of withstanding physical stresses associated with the placement and removal,
- Pads must have run-on and runoff control,
- Pads must be operated in a manner which controls fugitive emissions, and
- Owner/operators must conduct inspections and maintenance programs to ensure the integrity of the pads.

On February 17, 2000, Asarco submitted a work plan to the State of Montana and USEPA that calls for four areas within the East Helena Plant to be upgraded to meet the design criteria (Asarco 2000). These areas are shown on Figure 4-3. Once the work plan has been fully implemented, Asarco intends to no longer use the existing speiss handling area for the storage of speiss. Instead, Asarco will store speiss material on certified pads or inside buildings.

4.2 FORMER ACID PLANT SEDIMENT DRYING AREA INTERIM MEASURES

Descriptions of each of the to-be-implemented interim measures for the former Acid Plant Drying Area are described in the following paragraphs. Plans and Drawings for these measures are in Appendix B. A plan for Operation and Maintenance (O&M) of the interim measures is included in Appendix C.

4.2.1 Runoff to Unpaved Areas

As described in Section 3.3, the former Acid Plant Drying Pad may be contributing to surface runoff problems at the plant. As Table 4-2 suggests, runoff from the pad can be improved by: 1) reducing the application rate of dust control water, as described above in 4.1.1, 2) optimizing water application practices specific to the former Acid Plant Drying Area, and 3) constructing run-on controls.

As for the Speiss Handling Area, site personnel will be instructed on the need to limit application of dust control water to the former sediment drying pad, while still making sure that traffic areas are sufficiently watered.

The amount of water coming onto the pad can also be reduced by controlling run-on from the water truck fill station. As shown on the drawings in Appendix B, a concrete curb will be constructed to keep spillage from the fill station off the sediment drying pad. This curb will be designed in accordance with *Montana Public Works Standards.*

4.2.2 Infiltration of Surface Water through Potholes and Cracks in Pavement

As described in Section 3.3, surface paving in the former Acid Plant Drying Area was found to contain local areas of cracks and potholes that may contribute to infiltration of surface runoff at the plant. As Table 4-2 suggests control of runoff can be improved by: 1) reducing the application rate of dust control water, 2) optimizing water application practices, and 3) patching or sealing of pavement surfaces.

The initial design for repair of pavement potholes, cracks, and other surface defects will be done in accordance with appropriate standards such as the Portland Cement Association's *Concrete Slab Surface Defects: Causes, Prevention, Repair* manual.

5.0 IMPLEMENTATION OF SOURCE CONTROL INTERIM MEASURES

The source control interim measures developed here are designed to be implemented in the short-term to reduce or eliminate ongoing releases until more long term measures are implemented. As discussed in Section 1.0, development and implementation of source control interim measures is an iterative process with more immediate controls implemented as discussed in this document. Pending the evaluation of groundwater, soils data, and evaluation of speiss handling practices, additional source control measures may be designed and implemented. The evaluation of soil and groundwater data are in progress. An evaluation of speiss handling practices as required by the Phase IV LDRs is also in progress.

The source control interim measures that involve modification of water application practices, and maintenance of drains can be implemented within a very short period after this plan is finalized. Measures involving paving and drainage improvements will need to be implemented during the next construction season. A tentative schedule for implementation of the interim measures is presented in Figure 5-1.

6.0 REFERENCES

Asarco, 2000. Work Plan Modify Solid Mineral Processing Secondary Material Storage Pads To Meet Minimum Design Criteria In Accordance with Phase IV Regulations.

Hydrometrics, 1999a. Interim Measures Work Plan, East Helena Facility. Prepared for ASARCO, Inc. Revised July 1999.

Hydrometrics, 1999b. Current Conditions/Release Assessment, East Helena Facility. Prepared for ASARCO, Inc. Revised January 1999.

Color Map(s)

The following pages contain color that does not appear in the scanned images.

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GROUNDWATER SOURCE CONTROLS DESIGN ANALYSIS PLANS AND SPECIFICATIONS
EAST HELENA SMELTER FACILITY
EAST HELENA, MONTANA

INTERIM MEASURES SOURCE CONTROL AREAS

FIGURE 1-1

UPDATE TIME: 9:46AM
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Hydrometrics, Inc.

NORTH

SCALE
(In Feet)
0 500

LEGEND

DH-38 31 INTERIM MEASURES MONITORING WELL LOCATION/ CONCENTRATION

DH-29 27 RI/FS MONITORING WELL LOCATION/CONCENTRATION

DUEL <0.005 PRIVATE WELL LOCATION/ CONCENTRATION

ARSENIC CONCENTRATION CONTOURS

- 200
- 100
- 50
- 10
- 5.0
- 1.0
- 0.05

NOTES:

1. INTERIM MEASURES WELLS SAMPLED IN DECEMBER 1999.
2. RI/FS WELLS SAMPLED IN NOVEMBER 1999.
3. ALL CONCENTRATIONS VALUES IN mg/L.

GROUNDWATER SOURCE CONTROLS DESIGN
ANALYSIS PLANS AND SPECIFICATIONS
EAST HELENA SMELTER FACILITY
EAST HELENA, MONTANA

NOVEMBER/DECEMBER 1999
DISSOLVED ARSENIC CONCENTRATIONS
IN SHALLOW GROUNDWATER

FIGURE
1-2

Hydrometrics, Inc.

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GROUNDWATER SOURCE CONTROLS DESIGN
ANALYSIS PLANS AND SPECIFICATIONS
EAST HELENA SMELTER FACILITY
EAST HELENA, MONTANA

NOVEMBER/DECEMBER 1999
DISSOLVED CADMIUM CONCENTRATIONS
IN SHALLOW GROUNDWATER

FIGURE
1-3

UPDATE TIME: 9:49AM
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Hydrometrics, Inc.

NOTES:

1. INTERIM MEASURES WELLS SAMPLED IN DECEMBER 1999.
2. RI/FS WELLS SAMPLED IN NOVEMBER 1999.
3. ALL CONCENTRATIONS VALUES IN mg/L.

GROUNDWATER SOURCE CONTROLS DESIGN ANALYSIS PLANS AND SPECIFICATIONS
EAST HELENA SMELTER FACILITY
EAST HELENA, MONTANA

NOVEMBER/DECEMBER 1999 DISSOLVED LEAD CONCENTRATIONS IN SHALLOW GROUNDWATER

FIGURE 1-4

UPDATE TIME: 9:52AM
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Hydrometrics, Inc.

SCALE
(In Feet)
0 500

LEGEND

DH-38 / 31 INTERIM MEASURES MONITORING WELL LOCATION/CONCENTRATION

DH-29 / 27 RI/FS MONITORING WELL LOCATION/CONCENTRATION

DUEL / <0.005 PRIVATE WELL LOCATION/CONCENTRATION

ZINK CONCENTRATION CONTOURS

200
100
50
10
5.0
1.0
0.05

NOTES:

1. INTERIM MEASURES WELLS SAMPLED IN DECEMBER 1999.
2. RI/FS WELLS SAMPLED IN NOVEMBER 1999.
3. ALL CONCENTRATIONS VALUES IN mg/L.

GROUNDWATER SOURCE CONTROLS DESIGN
ANALYSIS PLANS AND SPECIFICATIONS
EAST HELENA SMELTER FACILITY
EAST HELENA, MONTANA

**NOVEMBER/DECEMBER 1999
DISSOLVED ZINC CONCENTRATIONS
IN SHALLOW GROUNDWATER**

FIGURE
1-5

Hydrometrics, Inc.

UPDATE TIME: 9:53AM
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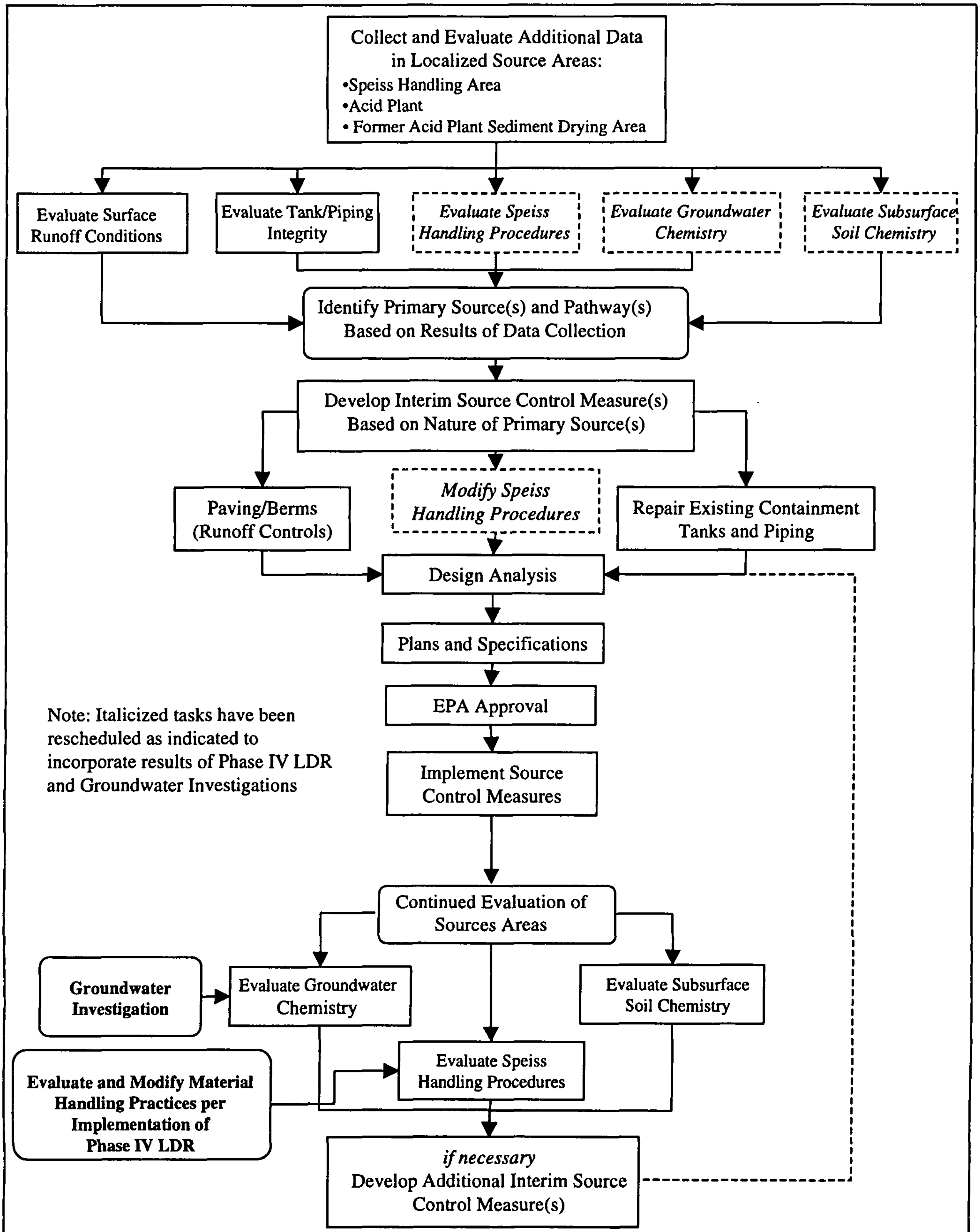
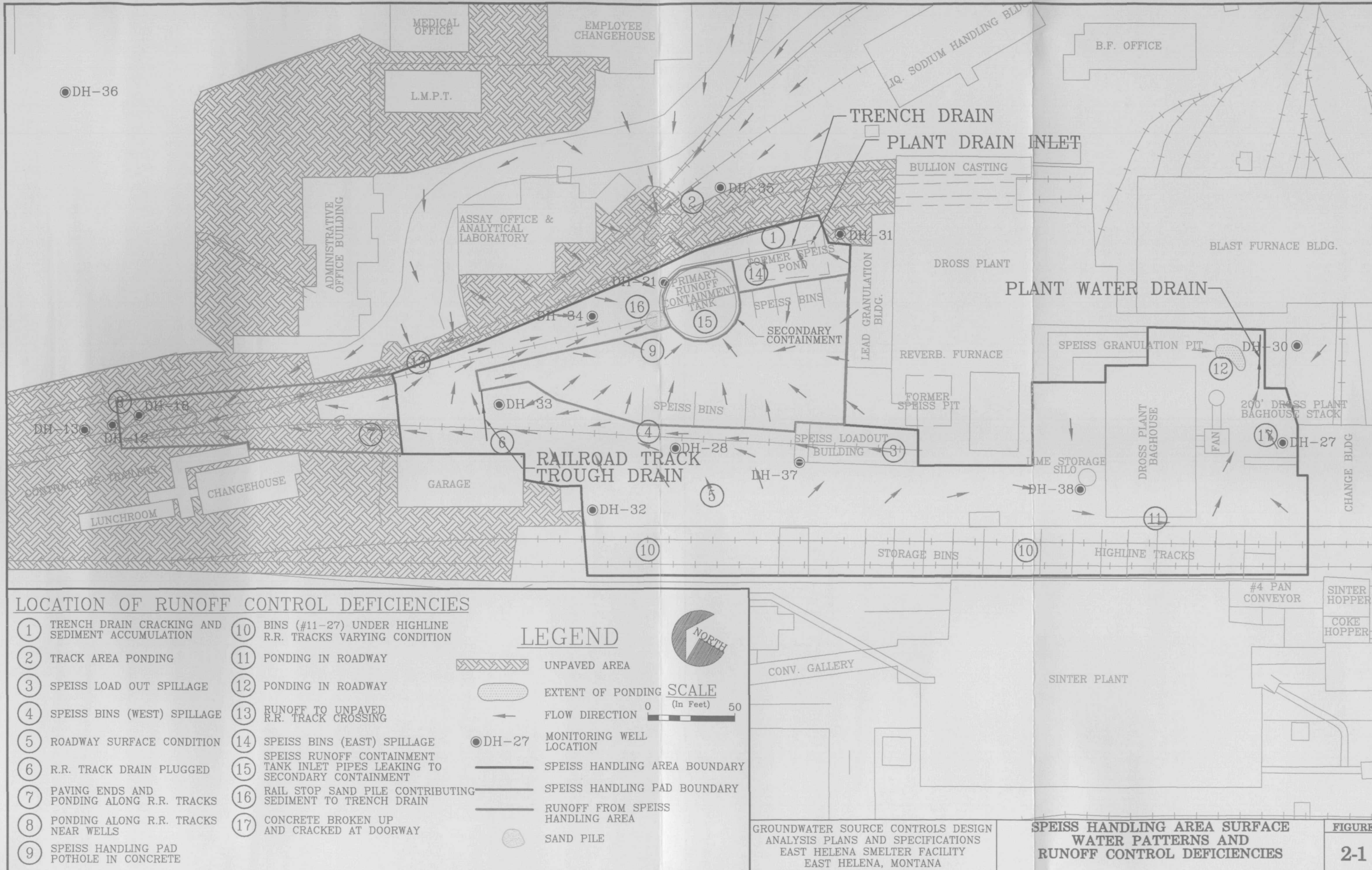
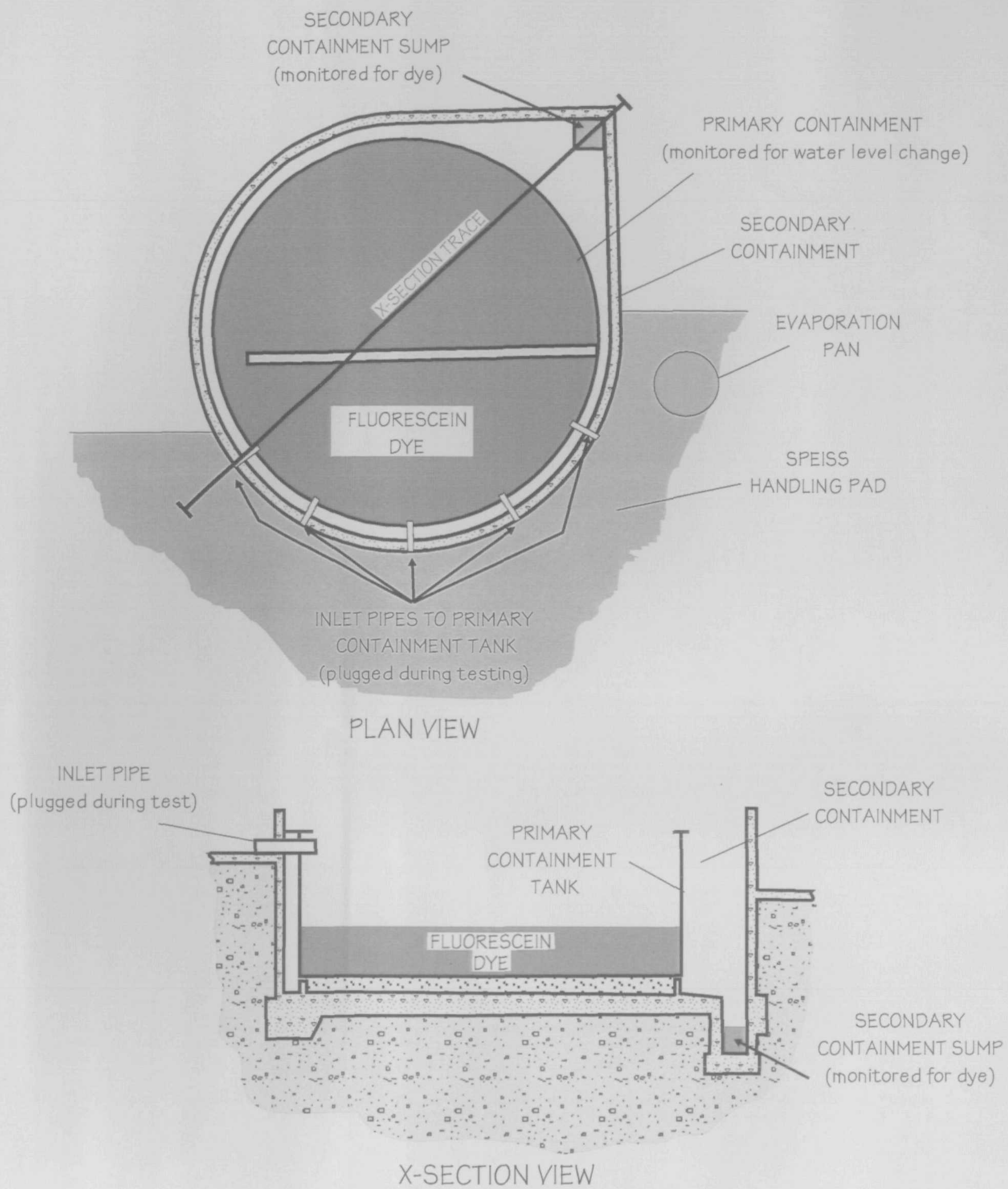


SIPPLEMENTAL GROUNDWATER INVESTIGATION REPORT INTERIM MEASURES EAST HELENA FACILITY	PROCESS SCHEMATIC FOR DEVELOPMENT, DESIGN, AND IMPLEMENTATION OF GROUNDWATER SOURCE CONTROL INTERIM MEASURES	FIGURE 1-6

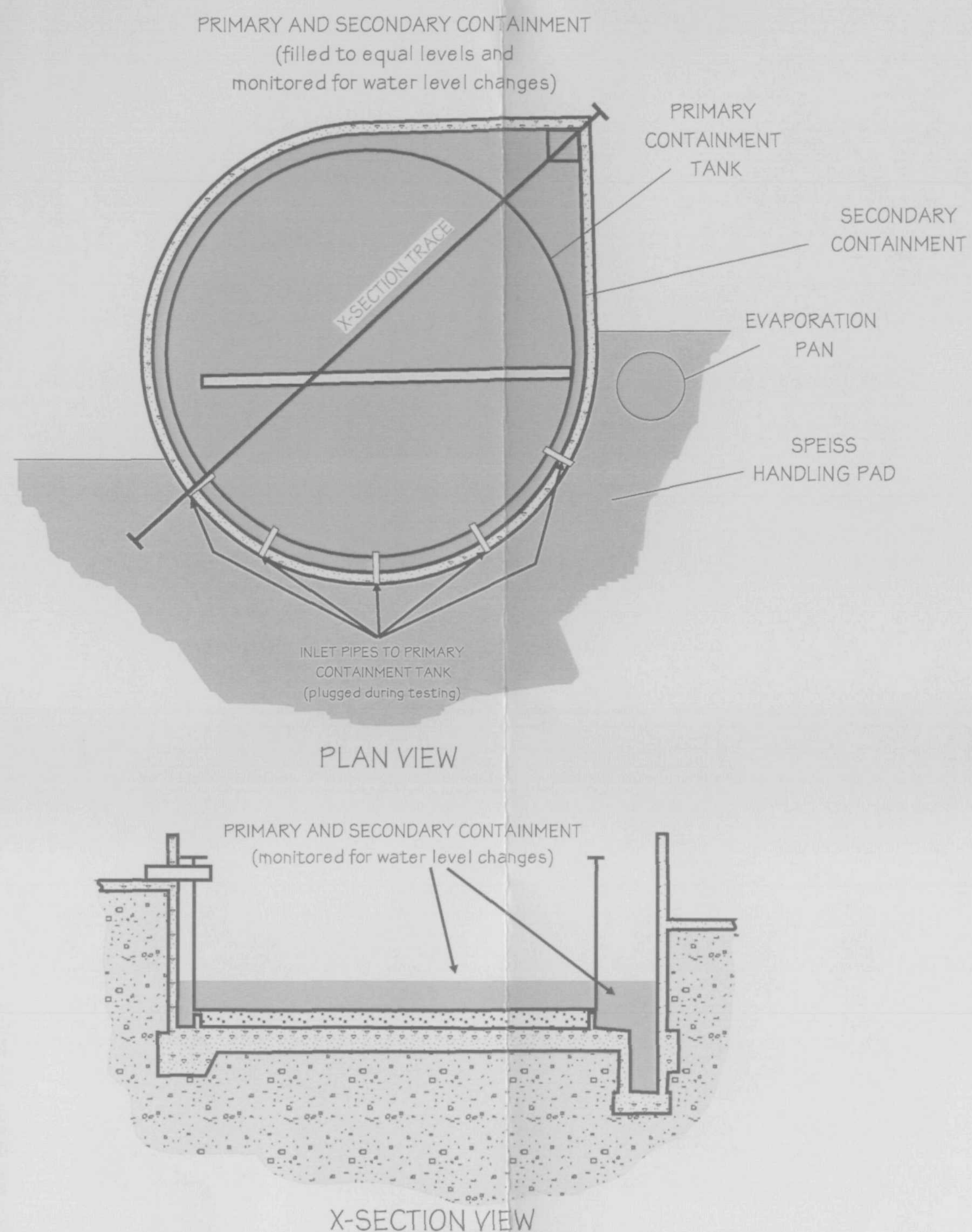


UPDATE TIME: 11:05AM
0249\HEL\030600\I:\Land Projects\1054b201\Dwg\1054b201h016.dwg

Hydrometrics, Inc.



PRIMARY CONTAINMENT
LEAK TESTING



SECONDARY CONTAINMENT
LEAK TESTING

not to scale	**GROUNDWATER SOURCE CONTROL** **INTERIM MEASURES** **DESIGN ANALYSIS, PLANS & SPECIFICATIONS** **EAST HELENA FACILITY**	**SCHEMATIC DIAGRAM OF** **RUNOFF CONTAINMENT** **LEAK TESTING**	**FIGURE** **2-2**

K:\PROJECT\1054\SPEISS\SCHEAMTIC1.CDR \HLN\3-9-00\065\0096

	Water Level Readings (feet)			
Date and Time	Primary Tank Staff Gage	Secondary Containment Staff Gage	Evaporation Pan Hook Gage	Evaporation Pan Engineer's Tape
9/14/1999 9:42	1.11	2.50	0.275	0.740
9/14/1999 15:55	1.11	2.50	0.272	0.735
9/15/1999 9:00	1.10	2.50	0.265	0.730
9/15/1999 17:00	1.10	2.49	0.261	0.725
9/16/1999 9:00	1.09	2.48	0.252	0.720
9/16/1999 15:30	1.09	2.48	0.247	0.720
9/17/1999 9:00	1.08	2.47	0.237	NM
	Calculated Change in Water Level Relative to Initial Reading (ft)			
9/14/1999 15:55	0.00	0.00	-0.002	-0.005
9/15/1999 9:00	-0.01	0.00	-0.010	-0.010
9/15/1999 17:00	-0.01	-0.01	-0.014	-0.015
9/16/1999 9:00	-0.02	-0.02	-0.023	-0.020
9/16/1999 15:30	-0.02	-0.02	-0.028	-0.020
9/17/1999 9:00	-0.03	-0.03	-0.038	NM

NM = not measured

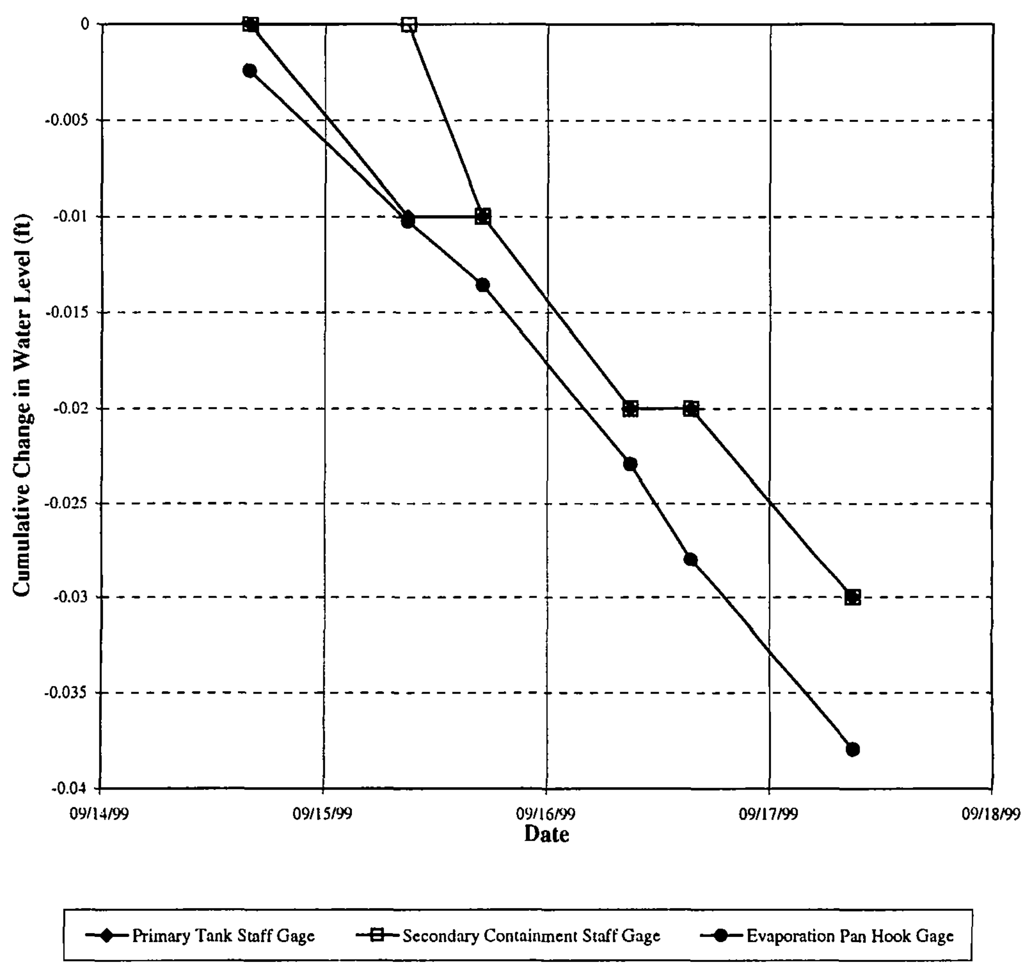


Figure 2-3. Speiss Handling Area Secondary Containment Test Results

Water Level Readings (feet)		
Date and Time	Primary Tank Staff Gage	Evaporation Pan Hook Gage
9/20/1999 14:30	1.93	0.213
9/21/1999 10:15	1.92	0.204
9/21/1999 14:30	1.91	0.203
9/22/1999 10:00	1.90	0.194
9/22/1999 16:30	1.90	0.190
9/23/1999 15:00	1.88	0.177
9/24/1999 16:15	1.88	0.155
9/27/1999 14:15	1.87	0.133
Calculated Change in Water Level Relative to Initial Reading (ft)		
9/21/1999 10:15	-0.01	-0.009
9/21/1999 14:30	-0.02	-0.011
9/22/1999 10:00	-0.03	-0.019
9/22/1999 16:30	-0.03	-0.023
9/23/1999 15:00	-0.05	-0.037
9/24/1999 16:15	-0.05	-0.058
9/27/1999 14:15	-0.06	-0.080

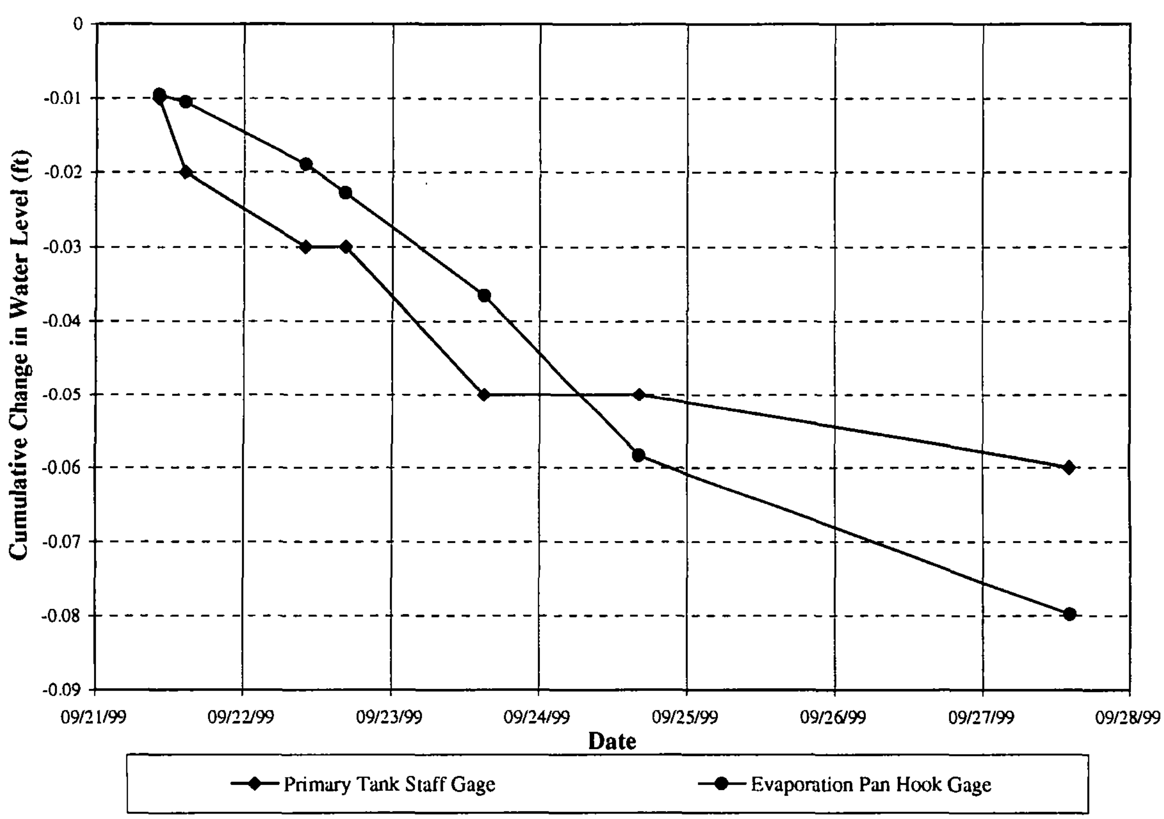


Figure 2-4. Speiss Handling Area Primary Tank Test Results

GROUNDWATER SOURCE CONTROLS DESIGN
ANALYSIS PLANS AND SPECIFICATIONS
EAST HELENA SMELTER FACILITY
EAST HELENA, MONTANA

FORMER ACID PLANT SEDIMENT DRYING AREA SURFACE WATER RUNOFF PATTERNS AND RUNOFF CONTROL DEFICIENCIES

FIGURE 3-1

UPDATE TIME: 3:13PM
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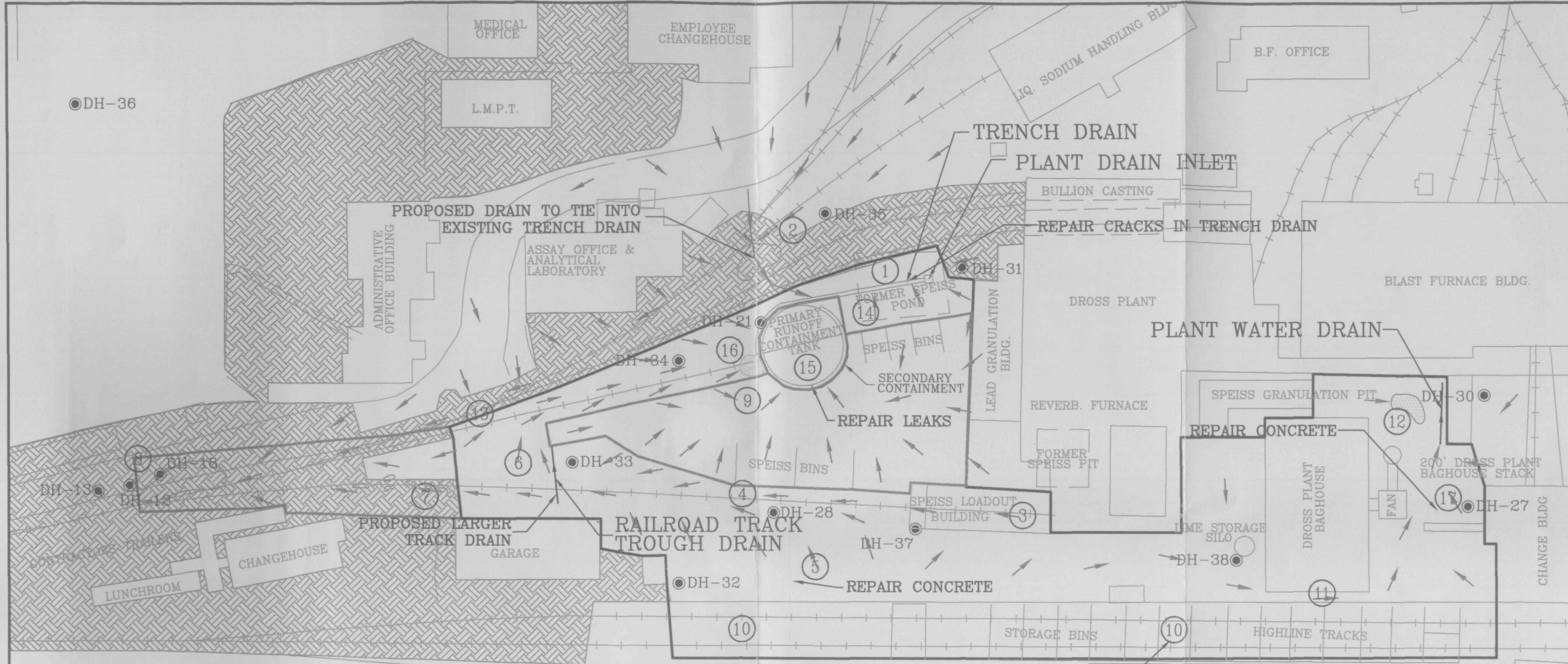
Hydrometrics, Inc.



LOCATION OF RUNOFF CONTROL DEFICIENCIES

1. TRENCH DRAIN CRACKING AND SEDIMENT ACCUMULATION
2. TRACK AREA PONDING
3. SPEISS LOAD OUT SPILLAGE
4. SPEISS BINS (WEST) SPILLAGE
5. ROADWAY SURFACE CONDITION
6. R.R. TRACK DRAIN PLUGGED
7. PAVING ENDS AND PONDING ALONG R.R. TRACKS
8. PONDING ALONG R.R. TRACKS NEAR WELLS
9. SPEISS HANDLING PAD POTHOLE IN CONCRETE
10. BINS (#11-27) UNDER HIGHLINE R.R. TRACKS VARYING CONDITION
11. PONDING IN ROADWAY
12. PONDING IN ROADWAY
13. RUNOFF TO UNPAVED R.R. TRACK CROSSING
14. SPEISS BINS (EAST) SPILLAGE
15. SPEISS RUNOFF CONTAINMENT TANK INLET PIPES LEAKING TO SECONDARY CONTAINMENT
16. RAIL STOP SAND PILE CONTRIBUTING SEDIMENT TO TRENCH DRAIN
17. CONCRETE BROKEN UP AND CRACKED AT DOORWAY

GROUNDWATER SOURCE CONTROLS DESIGN ANALYSIS PLANS AND SPECIFICATIONS
EAST HELENA SMELTER FACILITY
EAST HELENA, MONTANA

SPEISS HANDLING AREA SURFACE WATER DRAINAGE IMPROVEMENTS

FIGURE 4-1

UPDATE TIME: 3:23PM
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Hydrometrics, Inc.

NORTH

SCALE (In Feet)
0 50

LEGEND

- UNPAVED AREA
- FORMER SEDIMENT DRYING PAD (THIS AREA ALSO PAVED)
- FORMER ACID PLANT SEDIMENT DRYING AREA
- FLOW DIRECTION
- PONDED AREA
- DH-20 MONITORING WELL LOCATION

LOCATION OF RUNOFF CONTROL DEFICIENCIES

1. EDGE OF PAVING
2. PONDING ALONG EDGE OF PAVING
3. PONDING ALONG EDGE OF PAVING
4. PONDING ON EXISTING APSD PAD
5. PAD GRADED TO DRAIN ONTO UNPAVED AREA
6. CONDITION OF APSD PAD
7. WATER TRUCK FILL STATION

GROUNDWATER SOURCE CONTROLS DESIGN ANALYSIS PLANS AND SPECIFICATIONS
EAST HELENA SMELTER FACILITY
EAST HELENA, MONTANA

FORMER ACID PLANT SEDIMENT DRYING AREA SURFACE WATER RUNOFF PATTERNS AND DRAINAGE IMPROVEMENTS

FIGURE 4-2

UPDATE TIME: 3:33PM
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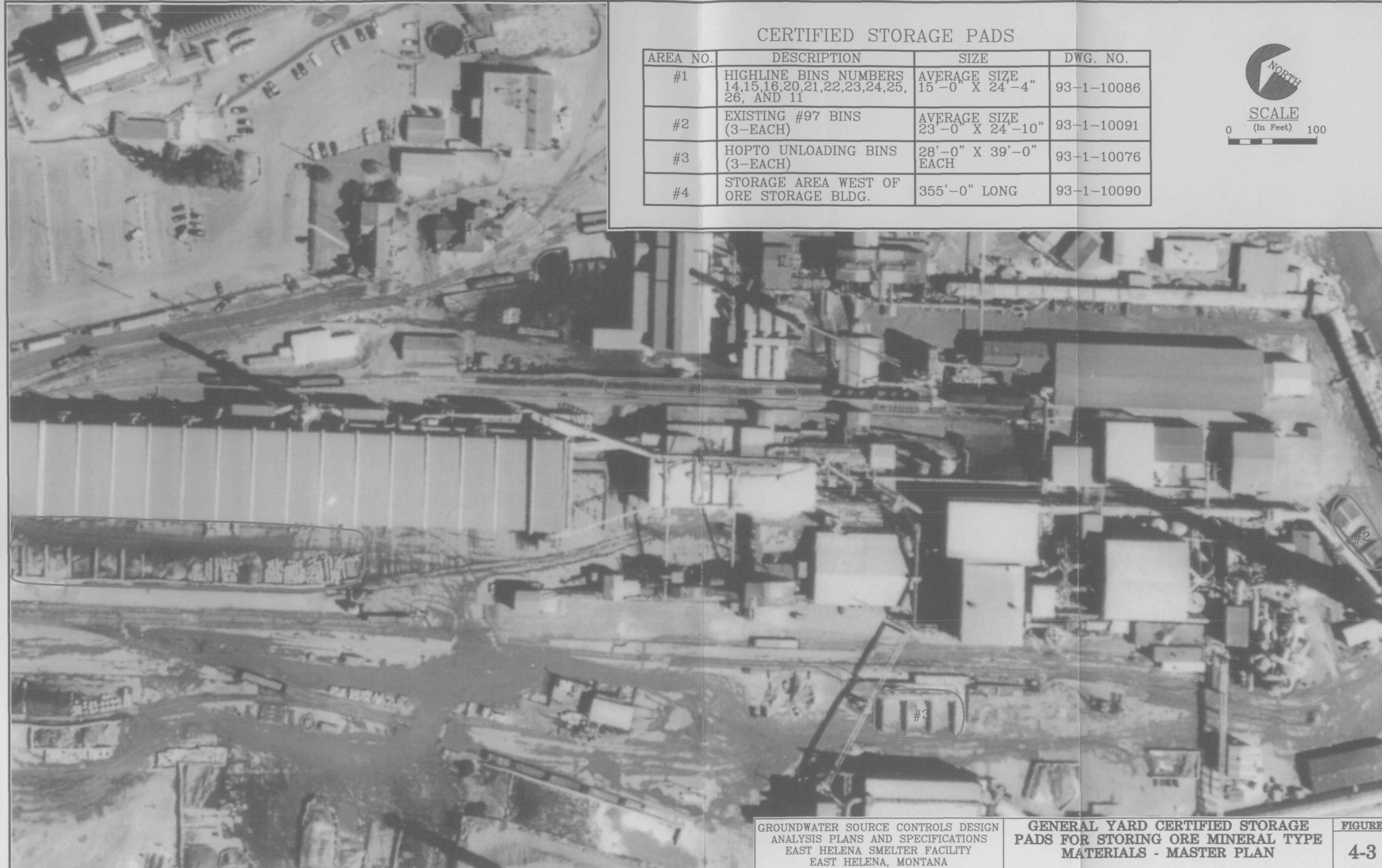
Hydrometrics, Inc.

CERTIFIED STORAGE PADS

AREA NO.	DESCRIPTION	SIZE	DWG. NO.
#1	HIGHLINE BINS NUMBERS 14,15,16,20,21,22,23,24,25, 26, AND 11	AVERAGE SIZE 15'-0" X 24'-4"	93-1-10086
#2	EXISTING #97 BINS (3-EACH)	AVERAGE SIZE 23'-0" X 24'-10"	93-1-10091
#3	HOPTO UNLOADING BINS (3-EACH)	28'-0" X 39'-0" EACH	93-1-10076
#4	STORAGE AREA WEST OF ORE STORAGE BLDG.	355'-0" LONG	93-1-10090

NORTH

SCALE
0 (In Feet) 100



GROUNDWATER SOURCE CONTROLS DESIGN
ANALYSIS PLANS AND SPECIFICATIONS
EAST HELENA SMELTER FACILITY
EAST HELENA, MONTANA

GENERAL YARD CERTIFIED STORAGE PADS FOR STORING ORE MINERAL TYPE MATERIALS - MASTER PLAN

FIGURE
4-3

UPDATE TIME: 10:14AM
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Hydrometrics, Inc.

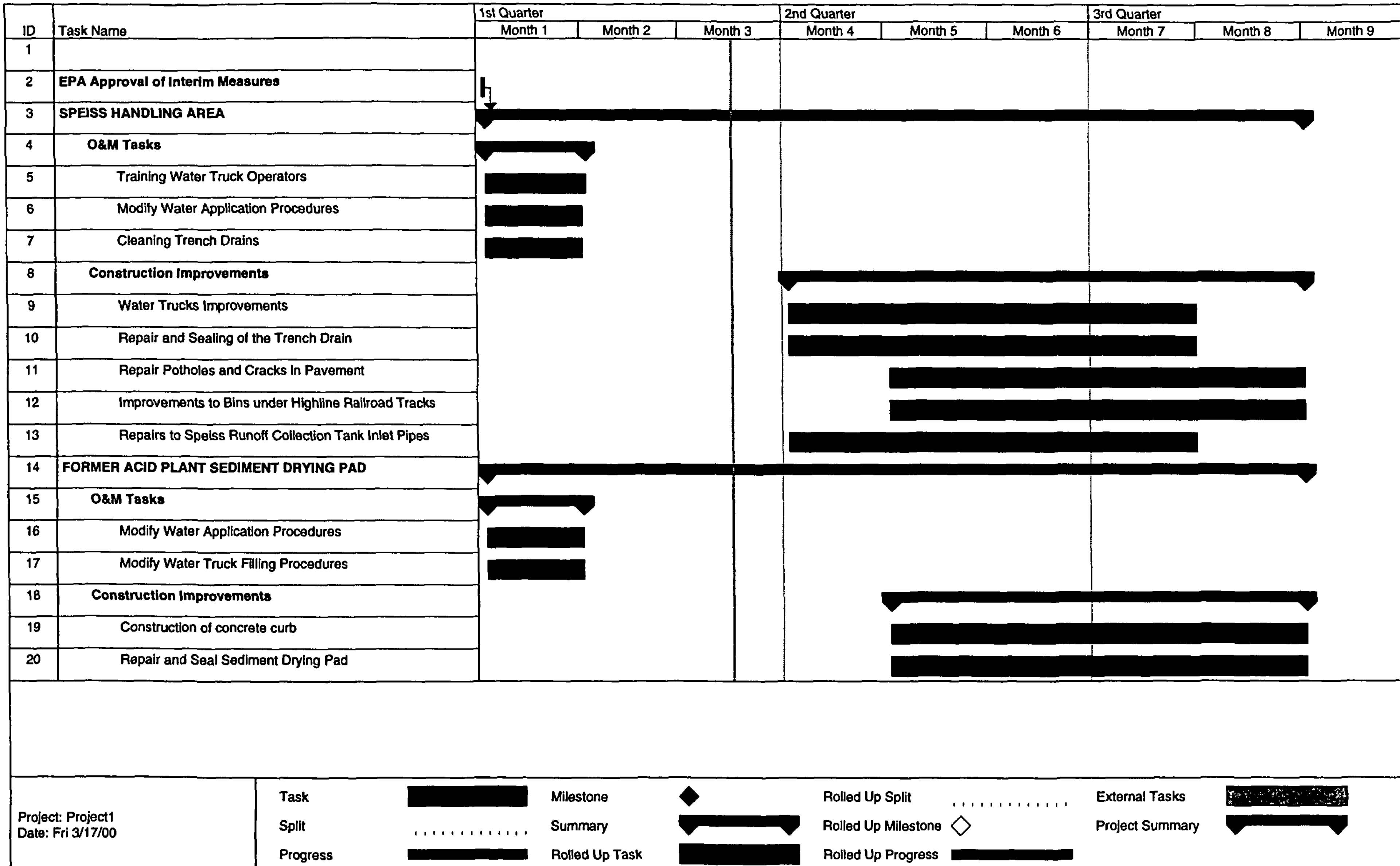

FIGURE 5-1. IMPLEMENTATION SCHEDULE FOR SOURCE CONTROL INTERIM MEASURES

Project1.mpp , Fri 3/17/00

EXHIBITS

TARGET SHEET

EPA REGION VIII

SUPERFUND DOCUMENT MANAGEMENT SYSTEM

DOCUMENT NUMBER: 1059479

SITE NAME: EAST HELENA NPL (OU2-RV1 RESIDENTIAL), EAST HELENA RCRA CORRECTIVE ACTION

DOCUMENT DATE: 03/01/2000

DOCUMENT NOT SCANNED

Due to one of the following reasons:

- ☐ PHOTOGRAPHS
- ☐ 3-DIMENSIONAL
- ☐ OVERSIZED
- ☑ AUDIO/VISUAL
- ☐ PERMANENTLY BOUND DOCUMENTS
- ☐ POOR LEGIBILITY
- ☐ OTHER
- ☐ NOT AVAILABLE
- ☐ TYPES OF DOCUMENTS NOT TO BE SCANNED (Data Packages, Data Validation, Sampling Data, CBI, Chain of Custody)

DOCUMENT DESCRIPTION:

1 - 3 1/4" FLOPPY - GROUNDWATER SOURCE CONTROL INTERIM MEASURES, DESIGN ANALYSIS, PLANS AND SPECIFICATIONS

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(303) 312-6473

TARGET SHEET

EPA REGION VIII

SUPERFUND DOCUMENT MANAGEMENT SYSTEM

DOCUMENT NUMBER: 1059479

SITE NAME: EAST HELENA NPL (OU2-RV1 RESIDENTIAL), EAST HELENA RCRA CORRECTIVE ACTION

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☐ POOR LEGIBILITY

☐ OTHER

☐ NOT AVAILABLE

☐ TYPES OF DOCUMENTS NOT TO BE SCANNED
(Data Packages, Data Validation, Sampling Data, CBI, Chain of Custody)

DOCUMENT DESCRIPTION:

EXHIBIT 1 SPEISS SETTLING TANK PLAN (1989) PRIOR TO REMOVAL
OF SPEISS SETTLING PIT AND SPEISS GRANULATING CIRCUIT
EXHIBIT 2 SPEISS SETTLING TANK SECTIONS (1989)

Contact the Superfund Records Center to view available document.
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APPENDIX A

PHOTO LOG

PHOTOGRAPHS OF SPEISS HANDLING AREA

RUNOFF CONTAINMENT AND CONVEYANCES FIELD TESTING

Track Area Ponding
(see Figure 2-1, Number 2)

Speiss Loadout Facility Spillage
(see Figure 2-1, Number 3)

Speiss Bins (West) Spillage
(see Figure 2-1, Number 4)

Speiss Bins (East) Spillage
(see Figure 2-1, Number 14)

RR Track Drain Plugged
(see Figure 2-1, Number 6)

Paving Ends and Ponding Along RR Tracks
(see Figure 2-1, Number 7)

Roadway Surface Condition and Water Truck Runoff Near West Speiss Bins
(see Figure 2-1, Number 5)

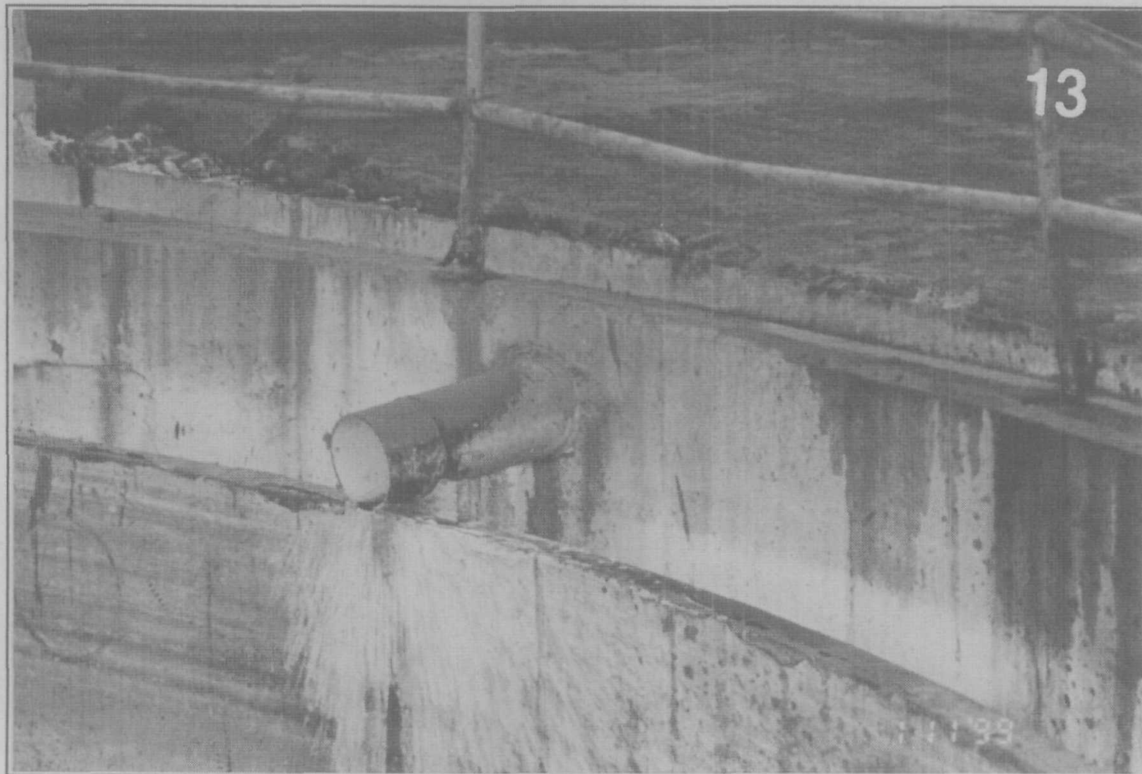
Roadway Surface Condition and Water Truck Runoff Near West Speiss Bins
(see Figure 2-1, Number 5)

Pothole in Roadway (see Figure 2-1, Number 9)

Ponding Along RR Tracks Near Wells DH-12, DH-13
(see Figure 2-1, Number 8)

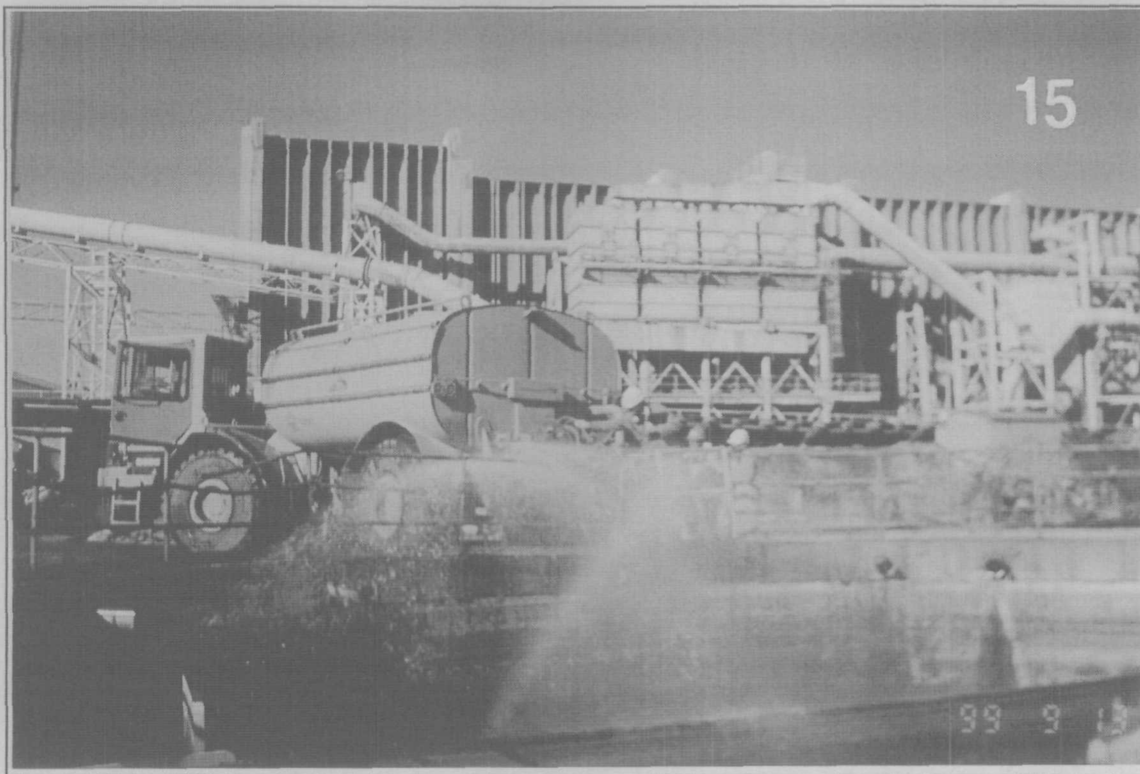
Ponded Areas in Roadway Around Dross Plant Baghouse
(see Figure 2-1, Number 11)

Runoff to Unpaved RR Track Crossing
(see Figure 2-1, Number 13)

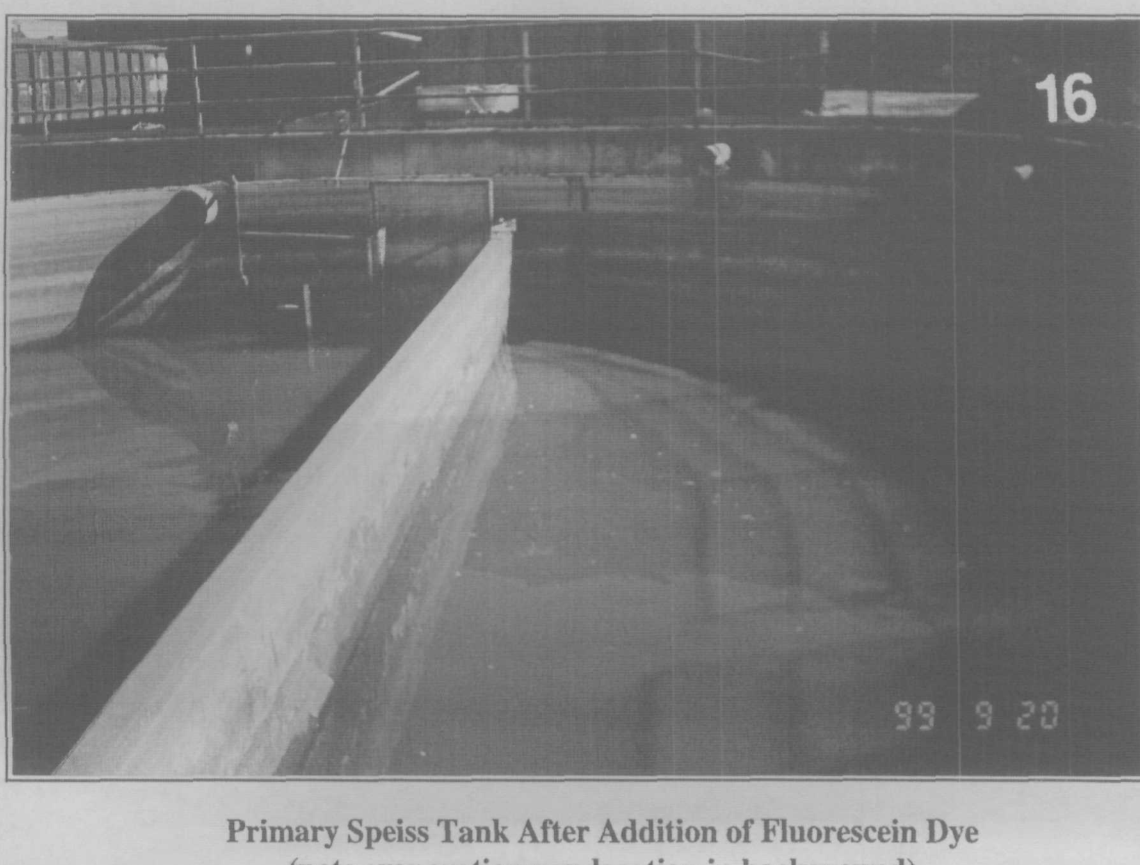


Primary Speiss Tank Inlet Pipes Leaking to Secondary Containment
(see Figure 2-1, Number 15)

Broken Concrete at Charge Car Building Door
(see Figure 2-1, Number 17)



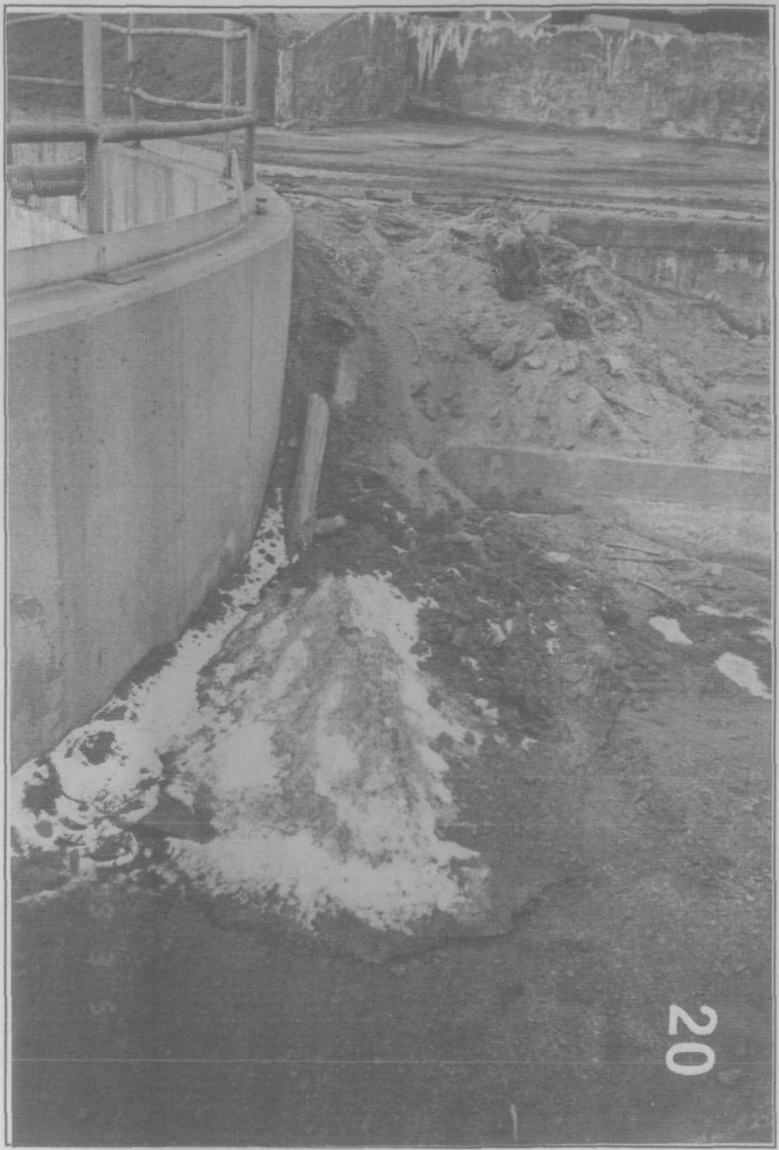
Filling Primary Speiss Tank and Secondary Containment Using Water Truck



Primary Speiss Tank After Addition of Fluorescein Dye
(note evaporation pan location in background)

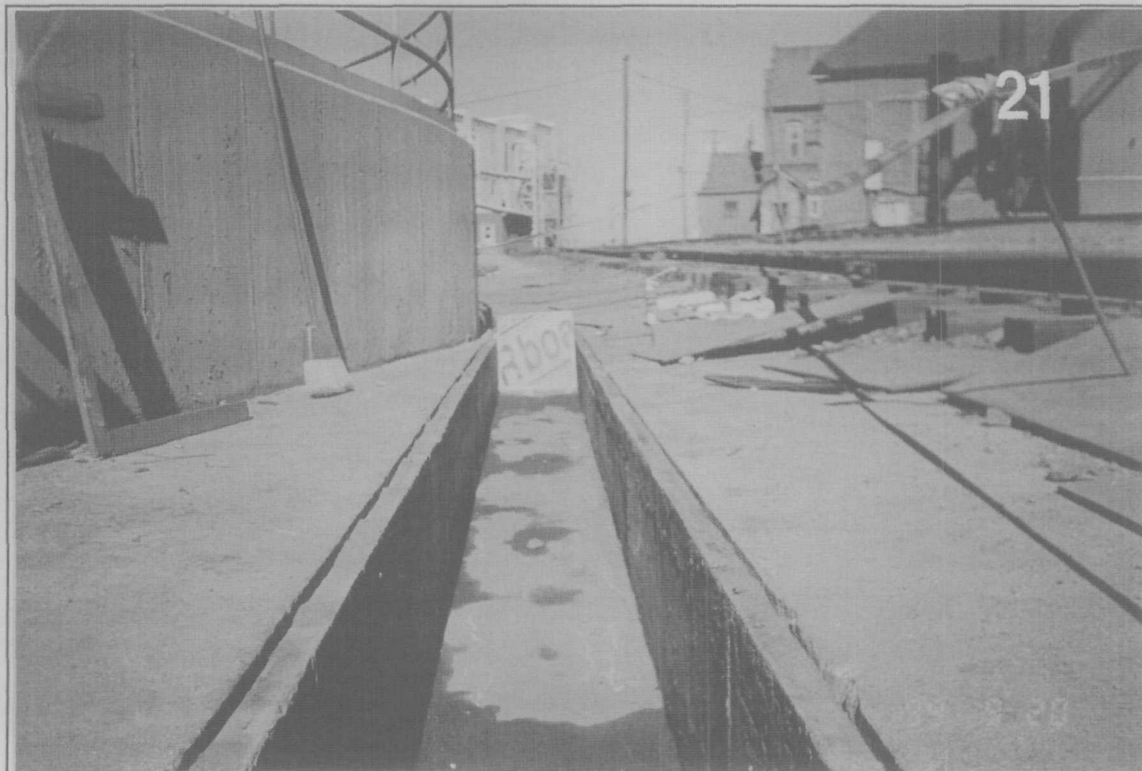
Trench Drain Location Adjacent to Well DH-21

Sediment Accumulation in Trench Drain Prior to Cleaning
(see Figure 2-1, Number 1)



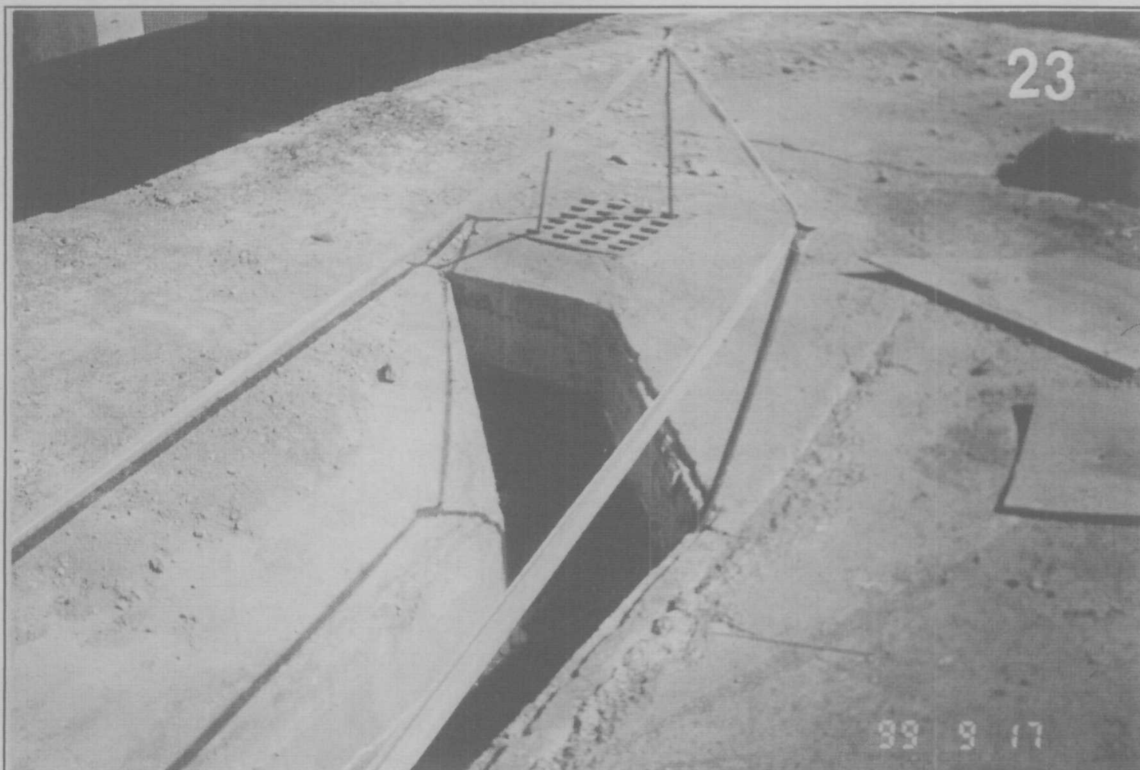
Sand Pile Covering Trench Drain at Upstream End
(see Figure 2-1, Number 16)

Trench Drain at Upstream End After Removal of Sand Pile
(note cracks at base of speiss tank and in trench wall)
(see Figure 2-1, Number 16)



Trench Drain After Sediment Removal

Section of Trench Drain Isolated with Bentonite Dams



Sediment and Ponded Water in Trench Drain at Plant Drain Inlet
(see Figure 2-1, Number 1)

Ponding on Former Acid Plant Sediment Drying Pad with Water Truck Fill Station in Background (see Figure 3-1, Number 4)

Ponding on Former Acid Plant Sediment Drying Pad (see Figure 3-1, Number 4)

Cracked Concrete on Former Acid Plant Sediment Drying Pad
(see Figure 3-1, Number 6)

APPENDIX B

INTERIM MEASURES PLANS AND DRAWINGS FOR PROPOSED DRAINAGE IMPROVEMENT

TARGET SHEET

EPA REGION VIII

SUPERFUND DOCUMENT MANAGEMENT SYSTEM

DOCUMENT NUMBER: 1059479

SITE NAME: EAST HELENA NPL (OU2-RV1 RESIDENTIAL), EAST HELENA RCRA CORRECTIVE ACTION

DOCUMENT DATE: 03/01/2000

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☐ PHOTOGRAPHS

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☐ OTHER

☐ NOT AVAILABLE

☐ TYPES OF DOCUMENTS NOT TO BE SCANNED
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DOCUMENT DESCRIPTION:

APPENDIX B DRAWING 93-1-10086 GENERAL YARD, CERTIFIED
STORAGE PADS, HIGHLINE BINS, GENERAL
ARRANGEMENT & DETAILS
SHEET 1 PROPOSED DRAIN IMPROVEMENTS

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APPENDIX C

OPERATIONS AND MAINTENANCE PLAN

FOR

SOURCE CONTROL INTERIM MEASURES

AT THE

EAST HELENA FACILITY

1.0 OPERATIONS AND MAINTENANCE

The IM review of surface water runoff conditions in the Speiss Handling Area and the former Acid Plant Sediment Drying Area identified in the need for additional O&M activities to address potential groundwater impacts as a result of surface water runoff. The purpose of this O&M Plan is to provide guidelines for inspecting and maintaining surface water runoff conveyances and controls to reduce the potential for surface water infiltration.

2.0 PREVENTIVE AND CORRECTIVE MAINTENANCE

In addition to specific drainage improvements proposed in the design analysis, maintaining effective runoff control in the Speiss Handling Area and former Acid Plant Sediment Drying Area will require ongoing appraisal of water application procedures, review of material handling and inspection and maintenance of runoff conveyances. Specific maintenance measures for the Speiss Handling Area and the former Acid Plant Sediment Drying Area are described in Section 2.1 and 2.2, below. Drainage patterns and related features for The Speiss Handling Area and the former Acid Plant Sediment Drying Area are shown in Figures 1 and 2.

2.1 Speiss Handling Area

2.1.1 Water Application

Water application for dust suppression should be conducted in a manner that minimizes excess runoff and mobilization of speiss.

1. If applying dust suppression water to speiss stockpiles, care should be taken to apply water at rates that do not cause remobilization of the speiss, either by physically blowing it outside of the bin area with the application spray or washing it away in runoff.
2. Application rates should be moderated throughout the Speiss Handling Area to prevent large amounts of runoff or ponding.

2.1.2 Material Handling

Material handling maintenance needs should be assessed on a daily basis to make sure that there is not excess speiss present outside of the runoff containment area (Figure 1). Specifically, the speiss handling area should be checked to see whether speiss stockpiles are stored within the primary runoff containment area; and the perimeter areas should be checked for speiss spillage, with particular emphasis in the following areas:

1. Box car unloading facility
2. Head of perimeter trench drain near speiss runoff containment tank.
3. Speiss load-out facility and track area to the north
4. Areas behind speiss bins

Any spilled speiss should be cleaned up and moved to the primary runoff containment pad (Figure 1).

2.1.3 Conveyances and Drainage Controls

Runoff conveyances need to be kept clear of sediment and debris. Runoff conveyances should be cleaned on a monthly basis or more frequently if required to maintain effective drainage. Maintenance requirements for surface water runoff conveyances include the following:

1. Clean sediment and debris from railroad track drain north of the speiss load-out facility and confirm that the drain is effectively intercepting surface runoff from load-out facility.
2. Clean sediment and debris from the perimeter trench drain for the speiss area runoff collection tank and the associated plant water drain to the southeast.
3. Remove any sediment or debris that may be blocking drainage inlet pipes to the speiss runoff containment tank.

2.2 Former Acid Plant Sediment Drying Area

2.2.1 Water Application

Water application for dust suppression should be conducted in a manner that minimizes run-on to and runoff from the former Acid Plant Sediment Drying Area.

1. Water should only be applied on the concrete drying pad if there are materials stored on the pad that specifically require dust control.
2. Application rates should be moderated in the road area uphill from the former Acid Plant Sediment Drying Area so that large amounts of runoff are not generated.

2.2.2 Material Handling

If materials are stockpiled in the former Acid Plant Sediment Drying Area that require water application for dust suppression, a minimum amount of water should be used to meet the dust suppression needs.

2.2.3 Conveyances and Drainage Controls

Unpaved areas surrounding the sediment drying pad should be inspected for signs of ponding due to surface water runoff. Grading improvements should be made in unpaved areas as needed to minimize any areas of ponding.

Pavement should be inspected on a semi-annual basis (as described in Section 3). Periodic concrete repairs and resealing may be required based on the inspection to maintain the integrity of the pad. Concrete and asphalt surfaces and pavements, will be inspected for defects such as cracks, potholes or spalling that could increase the potential for infiltration of surface water runoff. Any defects that increase the potential for infiltration of surface water runoff will be repaired.

3.0 SITE MONITORING AND INSPECTION REQUIREMENTS

Site inspections are necessary so that the interim corrective measures are performing adequately and provide proper maintenance of these measures. Two types of inspections are necessary: (1) informal inspections as part of routine O&M procedures, and (2) scheduled inspections performed at regular intervals, i.e. monthly, yearly, or some other frequency.

The informal inspection is actually a continuing effort by on-site personnel (Asarco's work force) performed in the course of their normal duties. Education of new personnel is required so that the continued effectiveness of the interim measures takes place. Scheduled inspections should be performed by an individual familiar with the design and construction of the interim measures. The scheduled inspection should document the condition of the interim measures and recommend needed maintenance.

3.1 INTERIM MEASURES INSPECTIONS

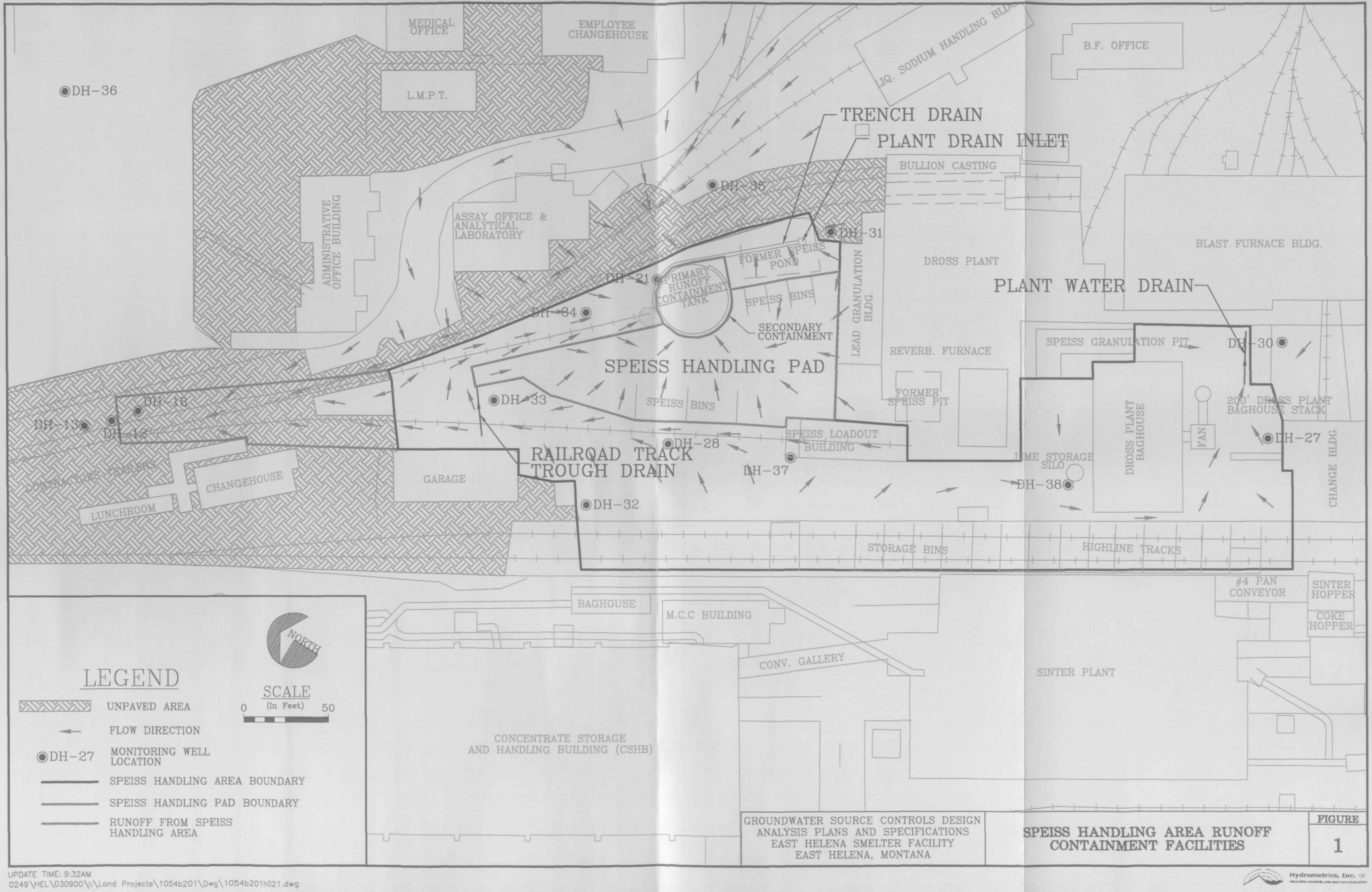
An inspection list and schedule has been developed to direct the periodic assessment of interim measures. The list describes specific interim measure areas to be inspected and the frequency of inspection. The purpose of this list is to make sure that specific O&M needs are addressed, that inspections are conducted at the required frequency, and that any potential problems are identified and addressed on a regular basis.

As described previously, informal inspections will be necessary to maintain interim measures as part of routine O&M. Scheduled inspections will evaluate the effectiveness of the O&M procedures with respect to the IM source control. Table 3-1 lists the O&M tasks that were identified to address IM source controls. The table also lists the frequency for O&M and associated inspection requirements for both the Speiss Handling Area and the former Acid Plant Sediment Drying Area.

TABLE 3-1 LIST OF SCHEDULED O&M REQUIREMENTS AND INSPECTIONS

Speiss Handling Area Inspection Items		Frequency of O&M	Frequency of Scheduled Inspections
1)	Speiss Handling Area should be checked for:		
	Speiss spillage outside of containment area	Daily	Monthly
	Areas of ponding indicating drainage problems	Daily	Monthly or after Storm Event
2)	Speiss tank trench drain should be inspected for:		
	Debris and sediment accumulation at surface near head of drain	Monthly	Monthly or after Storm Event
	Debris and sediment accumulation in trench drain	Monthly	Monthly or after Storm Event
	Debris and sediment accumulation at outlet to plant water drain	Monthly	Monthly or after Storm Event
	Cracking in concrete along bottom and sides of drain	---	Semi-Annually
3)	Speiss tank inlet pipes should be inspected for:		
	Plugging	Daily	Monthly or after Storm Event
	Leaks to secondary containment		Monthly
4)	Track drain under RR tracks should be inspected for sediment accumulation or other blockage	Daily	Monthly or after Storm Event
5)	Inspect repaired concrete/asphalt areas for cracking, spalling, other signs of deterioration	---	Semi-Annually
6)	Water application rates in the speiss handling area should be checked for:		
	Excessive application rates leading to ponding or large amounts of runoff	Daily	Monthly
	Excessive application to speiss stockpiles resulting in spreading of the speiss	Daily	Monthly

Former Acid Plant Sediment Drying Area Inspection Items			
1)	Evaluate dust suppression measures as follows:		
	Minimal overspray onto former sediment drying pad	Daily	Monthly
	Application rates don't result in excessive runoff	Daily	Monthly
	Water truck filling does not produce excessive spillage and runoff	Daily	Monthly
	Inspect concrete pad and adjacent unpaved surfaces for ponding	---	Monthly or after Storm Event
2)	Inspect run-on control curb for integrity (cracking, other deterioration)	---	Semi-Annually
3)	Inspect concrete/asphalt areas for cracking, spalling, other signs of deterioration	---	Semi-Annually



MEDICAL OFFICE
EMPLOYEE CHANGEHOUSE
LIQ. SODIUM HANDLING BLDG.
B.F. OFFICE
DH-36
L.M.P.T.
TRENCH DRAIN
PLANT DRAIN INLET
BULLION CASTING
DH-35
ADMINISTRATIVE OFFICE BUILDING
ASSAY OFFICE & ANALYTICAL LABORATORY
DH-31
BLAST FURNACE BLDG.
DROSS PLANT
FORMER SPEISS POND
LEAD GRANULATION BLDG.
DH-21
PRIMARY RUNOFF CONTAINMENT TANK
SPEISS BINS
PLANT WATER DRAIN
DH-34
SECONDARY CONTAINMENT
SPEISS HANDLING PAD
REVERB. FURNACE
SPEISS GRANULATION PIT
DH-30
DH-18
DH-33
SPEISS BINS
FORMER SPEISS PIT
200' DROSS PLANT BAGHOUSE STACK
DH-13
DH-12
DROSS PLANT BAGHOUSE
FAN
DH-27
SPEISS LOADOUT BUILDING
DH-28
RAILROAD TRACK TROUGH DRAIN
LIME STORAGE SILO
CONTRACTORS TRAILERS
DH-37
CHANGEHOUSE
GARAGE
DH-38
CHANGE BLDG
LUNCHROOM
DH-32
STORAGE BINS
HIGHLINE TRACKS
#4 PAN CONVEYOR
SINTER HOPPER
COKE HOPPER
BAGHOUSE
M.C.C BUILDING
NORTH
CONV. GALLERY
SINTER PLANT
LEGEND
UNPAVED AREA
FLOW DIRECTION
DH-27 MONITORING WELL LOCATION
SPEISS HANDLING AREA BOUNDARY
SPEISS HANDLING PAD BOUNDARY
RUNOFF FROM SPEISS HANDLING AREA
SCALE
(In Feet)
0
50
CONCENTRATE STORAGE AND HANDLING BUILDING (CSHB)
GROUNDWATER SOURCE CONTROLS DESIGN
ANALYSIS PLANS AND SPECIFICATIONS
EAST HELENA SMELTER FACILITY
EAST HELENA, MONTANA
SPEISS HANDLING AREA RUNOFF CONTAINMENT FACILITIES
FIGURE
1
UPDATE TIME: 9:32AM
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Hydrometrics, Inc.

GROUNDWATER SOURCE CONTROLS DESIGN
ANALYSIS PLANS AND SPECIFICATIONS
EAST HELENA SMELTER FACILITY
EAST HELENA, MONTANA

FORMER ACID PLANT SEDIMENT DRYING AREA SURFACE WATER RUNOFF PATTERNS

FIGURE 2

UPDATE TIME: 5:00PM
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Hydrometrics, Inc.

APPENDIX D

CONSTRUCTION QUALITY ASSURANCE PLAN
INTERIM MEASURES
EAST HELENA FACILITY

CONSTRUCTION QUALITY ASSURANCE PLAN
INTERIM MEASURES
EAST HELENA FACILITY

1.0 INTRODUCTION

This document and its addenda comprise the Construction Quality Assurance Plan (CQAP) for Interim Measures at the East Helena Facility. The CQAP outlines the Quality Assurance (QA) methods and procedures that will be used to verify and document that Interim Measures construction is completed in accordance with the plans and specifications developed for the measures.

Construction quality can be defined as conformance to properly developed requirements as defined in the construction plans and specifications. QA is a planned system of activities to provide confidence that the completed measure meets project requirements. Quality Control (QC) is a planned system of inspections and tests performed by the Supervising Contractor to monitor and control the direction of the Interim Measure Construction activities. This CQAP summarizes Construction Quality Assurance (CQA) responsibilities, authorities, and qualifications; and describes general quality assurance measures and reporting requirements to be used for ensuring quality and conformance to construction plans and specifications during implementation of Interim Measures. Supplemental Interim Measure specific CQA activities are attached as addenda to this general plan when the Interim Measures have been developed and designed.

2.0 CONSTRUCTION QUALITY ASSURANCE PLAN ELEMENTS

The following sections address CQAP responsibilities and authorities; project records; and data management and control.

2.1 RESPONSIBILITIES AND AUTHORITIES

A summary of project responsibilities and authorities relative to QA is included in the following sections. Figure 2-1 presents the QA Functional Organization Chart for interim measures.

2.1.1 Regulatory Agencies

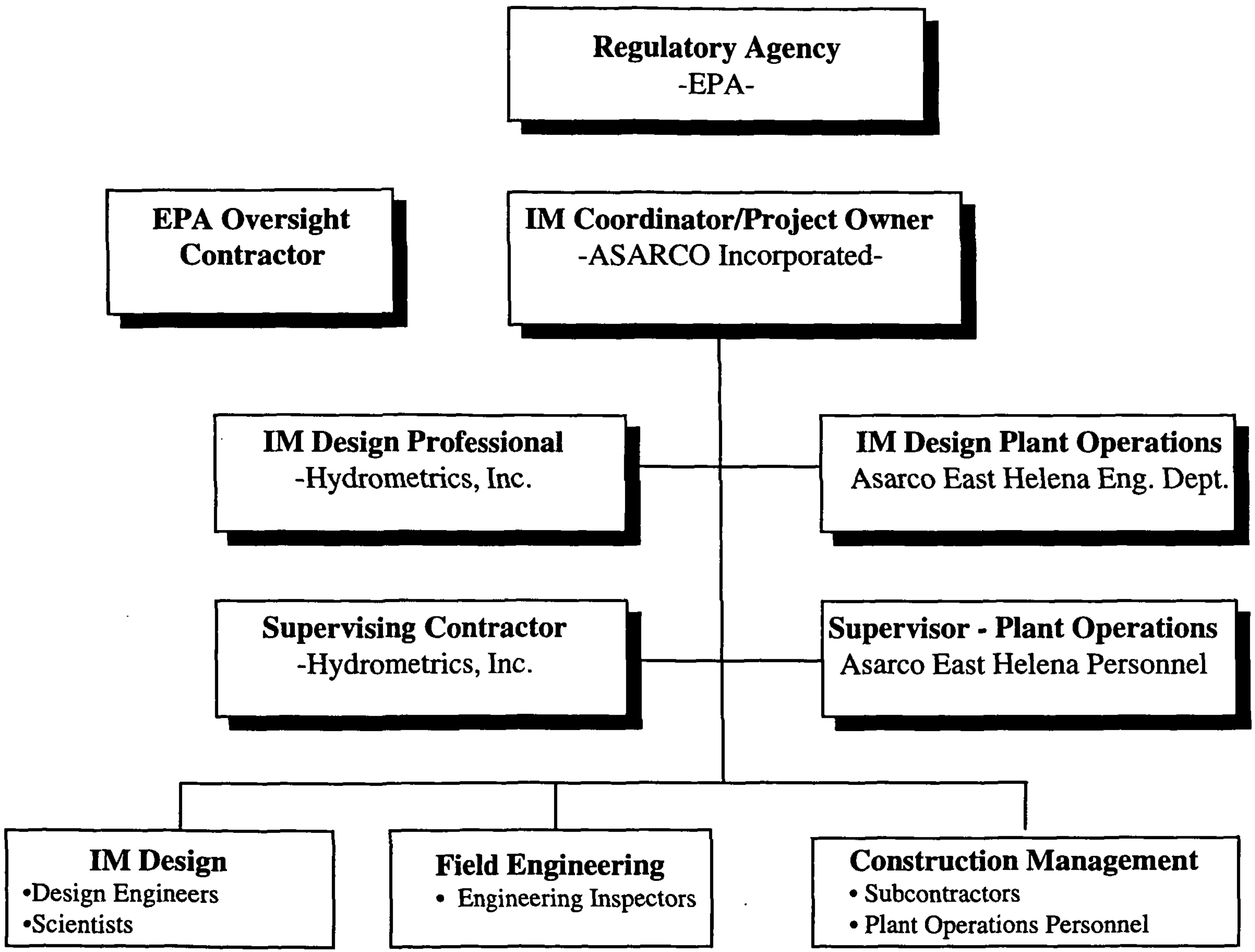
The U.S. Environmental Protection Agency (EPA) is the lead agency responsible for regulatory oversight of Interim Measures at the site. EPA is primarily responsible for ensuring public health and the environment are protected. Functional roles of the EPA during implementation of interim measures, are described in Table 2-1.

2.1.2 Project Owner

Asarco is the Project Owner for the East Helena Facility and is responsible for the control and implementation of IM activities. Asarco is also responsible for development and review of IM construction plans and specifications. Functional roles of the Project Owner are further defined in Table 2-1.

2.1.3 Interim Measure Design Professional

Since this is an operating plant, Asarco East Helena Plant Engineering Department will at times act as the IM Design Professional. For IM that is outside of the realm of plant operations, Hydrometrics, Inc. is the IM Design Professional at this Site and works with Asarco plant operation engineers to develop and design interim measures. The IM design Professional is primarily responsible for providing support to the Project Owner on development of designs, plans and specifications which meet project requirements. This includes technical support to plant engineers as well as independent project specific



ASARCO INCORPORATED COMPREHENSIVE PLANS & DOCUMENTS CONSTRUCTION QUALITY ASSURANCE PROJECT PLAN TACOMA, WASHINGTON	QUALITY ASSURANCE FUNCTIONAL ORGANIZATION	FIGURE 2-1

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TABLE 2-1. QUALITY ASSURANCE ROLES BY FUNCTIONAL POSITION

Regulatory Agency (EPA)	Project Owner (Asarco)	Remedial Design Professional	Supervising Contractor	Engineering Inspector	Subcontractors
• Reviews and approves the qualifications of the IM Professional and the Constructor. • Reviews and approves IM Work Plans, design documents, and construction plans and specifications. • Monitors the Construction program. • Conducts progress meetings. • Coordinates government agency interaction. • Ensures protection of public health and environment. • Verifies completion of work and approves project closeout.	• Controls and effects IM activities. • Assigns work to the IM Professional and Constructor. • Responsible for long term performance of the remedy.	• Since this is an operating plant the Supervising Contractor may be Asarco or its Designated Project Design Professional. • Prepares construction plans and specifications, work plans and other IM documents. • Identifies and obtains approvals needed to accomplish IM (i.e., permits, easements, etc.). • Provides engineered designs for IM. • Performs any necessary design changes during construction to include updates to plans and specifications and construction changes.	• Since this is an operating plant the Supervising Contractor may be Asarco or its Designated Project Contractor. • Assesses compliance with and obtains construction permits and approvals. • Provides required submittals including progress schedules, reports, and QC documentation. • Responsible for ensuring project safety for Site personnel and the public.	• Performs independent, on-site inspections, may include implementation or oversight of performance and certification testing. • Implements CQAP including testing, reporting, and construction inspection. • Performs on-site inspections, may include oversight of performance and certification testing.	• Implements CQAP for their specific construction activity. • Submits list of equipment and proposed methods of work to engineering inspectors. • Submits manufacturers' or suppliers' certification that materials meet specifications

development of IM design plans. Functional roles of the RD Professional are addressed in Table 2-1.

2.1.4 Supervising Contractor

Since this is an operating plant, Asarco East Helena Plant Operations Staff will at times act as the IM Supervising Contractor. For IM that is outside of the realm of plant operations, a project specific supervising contractor will be designated by Asarco. Since several different interim measures are being developed, each action or group of actions are considered project specific. The Supervising Contractor is primarily responsible for assuring that quality standards specified by the design documents and accepted trade practices are met. The functional roles of the Supervising Contractor are further addressed in Table 2-1. A Project Administrator will be employed by the Supervising Contractor to maintain project records as defined in Section 2.3. Project Inspectors will be employed to implement and assure adherence to the CQAP.

2.2 PROJECT RECORDS

Project records will be maintained by the Project Administrator of the Supervising Contractor. Section XI of the RCRA Consent Decree for the East Helena Plant addresses reporting requirements for this project. Submittals by the subcontractors and their vendors will include pertinent shop drawings, data sheets, material certifications, mix designs, permits, and other pertinent or required submittals. The Project Administrator will prepare various reports that describe the remediation construction activities and provide documentation that the construction conforms to approved plans and specifications. The specific reports, their content, distribution and distribution schedule will be developed for each specific IM construction activity. As a minimum the following reports will be part of the project records:

1. Inspection Testing Report
2. Daily Inspectors Report
3. Daily Summary Report

4. Problem Identification and Corrective Measures Report
5. Weekly Summary Report
6. Monthly Summary Report

2.3 DATA MANAGEMENT AND DOCUMENT CONTROL

All information relevant to remediation activities will be categorized as either (a) data, or (b) construction project records. Data are results from the measurement of some parameter of media and can include sampling and analytical results, and other tests or measurement (e.g., survey information). Construction project records consist of all documentation pertinent to IM activities.

Effective data management requires standardized procedures for the collection, analysis, classification, and control of data. Proper classification and assessment of data are key to managing data from many sources.

Database and electronic file security is controlled via network access limitations. Only authorized personnel have the access rights to create or change data in the database system. Electronic data and documents files are backed up nightly on a tape backup system. Backup files are rotated through off-site storage on a regular basis (e.g., weekly) to ensure that data can be recovered in the event of fire or other catastrophic loss.

The QA methods and procedures outlined in this CQAP will be used to verify and document that the IM is completed in accordance with plans and specifications, codes, standards and practices referenced therein.

2.4 MEETINGS

To effectively implement this plan, several meetings will be held to promote communication. The meetings are described below.

2.4.1 Pre-Construction Meeting

The meeting will be held before construction commences. The Supervising Contractor, Project owner and Design Professional will attend this meeting. At this meeting, the Supervising Contractors plans will be discussed as well as the CQAP and any of it's IM specific CQAP addendum.

2.4.2 Progress Meetings

These meetings will be held during construction and their frequency may vary with the amount of construction activity ongoing. While discussion at these meetings may include a wide variety of topics, it should also include any problems encountered or anticipated that are related to CQA. The Supervising Contractor, and RD professional will attend any progress meetings at which CQA is discussed; the owner and regulatory agency may also choose to attend.

ADDENDUM A TO APPENDIX IV

CONSTRUCTION QUALITY ASSURANCE PLAN FOR GROUNDWATER SOURCE CONTROLS

1. INTRODUCTION

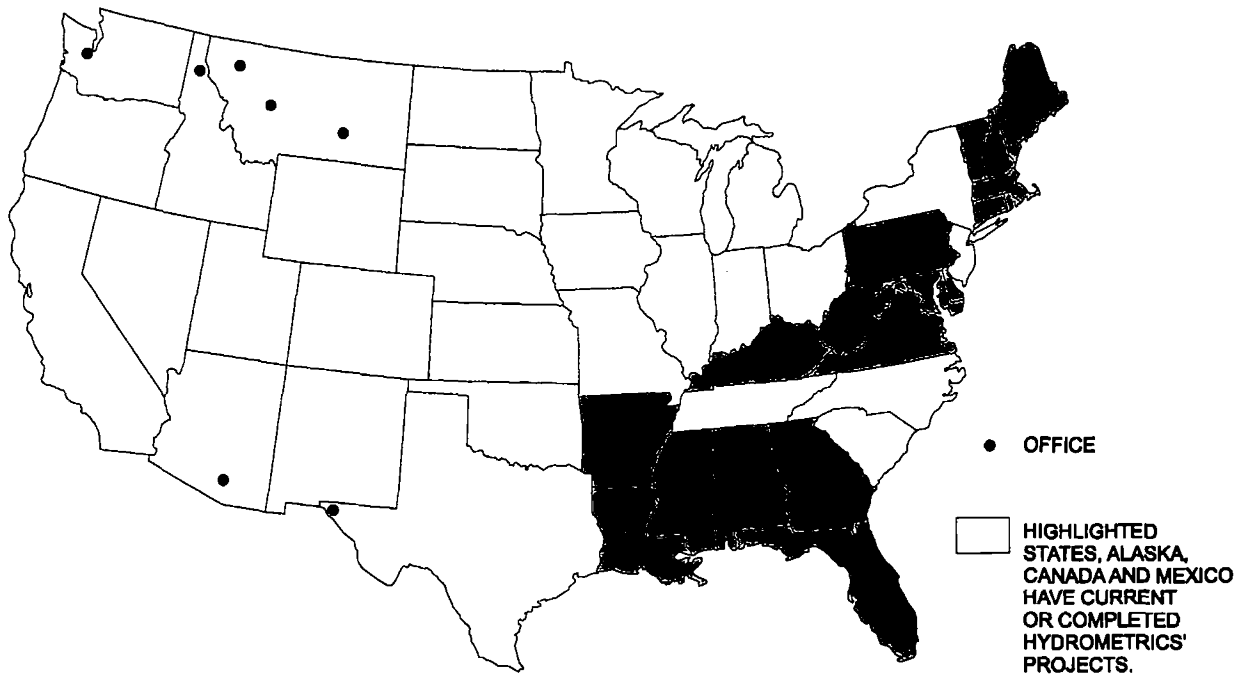
The Construction Quality Assurance Plan Addendum to the Construction Quality Assurance Plan (CQAP) provides guidance in attaining and maintaining quality in the construction of interim measures material groundwater source control measures. Execution of this plan will provide a reasonable level of confidence that the facilities are constructed in accordance with the Plans and Specifications. This addendum is intended to be used in conjunction with Project Plans and Specifications as well as the CQAP.

2. CQAP RESPONSIBILITY AND AUTHORITY

Section 2.1 of the CQAPP explains the responsibility and authority of the regulatory agencies, Project Owner, IM Design Professional, and Supervising Contractor. For source control items addressed in the Groundwater Source Control IM Report, Hydrometrics and the Asarco East Helena Engineering Department have shared the role of IM Design Professional. Implementation of the IM for source controls consists primarily of O&M actions and, as a result, East Helena Operations Staff fill the role of Supervising Contractor for this group of IM measures.

Source Control Measures consist primarily of water application adjustments, paving and drain repairs and installation of curbing features to re-route surface runoff. All of these activities are primarily operation and maintenance activities. O&M requirements for Source Controls are discussed in the O&M Plan (Appendix III). Since the source control measures are primarily operational and maintenance items, additional construction quality assurance procedures beyond those addressed in the O&M plan have not been developed. However, as described in the CQAP, project specific CQA procedures will be developed where the future

IM actions are outside the realm of plant O&M. This would include any additional source control measures that may be taken as well as any migration controls that would be implemented.



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